CEMENT

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Hydraulic cements are the binding agents in concrete and mortar. The hydraulic cements covered in this report are largely restricted to those varieties that can be loosely grouped as portland cement and/or masonry cement. The portland cement varieties are listed in table 16 and include blended cements. Data for combined sales of blended cements listed separately from portland cement are available within the monthly cement reviews of the U.S. Geological Survey (USGS) Mineral Industry Surveys series, starting with January 1998. Masonry cements in both the annual and monthly reports include true masonry cements, portland-lime cements, and plastic cements. Certain other hydraulic cements, most notably aluminous cement, are included within the world hydraulic cement production data given in table 23. Data for pure (unblended) cementitious or pozzolanic additives, such as fly ash and ground granulated blast furnace slag (GGBFS), are excluded in this report from U.S. data and, where possible, from international data. Where these materials are a component of blended (also called composite) cements, their tonnages are included. Straight GGBFS is being increasingly referred to by the U.S. cement industry as "slag cement," but this is misleading because the material is an additive. Although these materials are not finished cements in their own right, they play an important role as a partial substitute for portland cement in the United States and many other countries. Except where otherwise specified, activity levels in this report exclude Puerto Rico. Unless otherwise specified, indications of percentage or other changes expressed in this report compare activity in 2002 with that of 2001.

Overall, U.S. production of portland and masonry cements in 2002 rose by about 1% to 89.7 million metric tons (Mt), a new record (table 1). Output of clinker—the intermediate product of cement manufacture—increased by almost 4% to a new record of 81.5 Mt. The United States ranked third in the world in hydraulic cement production; world output in 2002 was about 1.8 billion metric tons (Gt).

In contrast to the higher cement output, continued weakness in the general U.S. economy in 2002 led to lower overall cement consumption levels in most months during the year. Consumption was further aggravated in the fourth quarter by relatively severe winter weather (vs. several mild winters previously). Apparent consumption (a calculated statistic) for the year declined by 2.5% to about 110 Mt, and consumption measured by shipments to final customers declined by almost 4% to about 108 Mt (tables 1, 9). The large shortfall in cement (and clinker) production relative to consumption continued to be met with imported material, but import levels declined significantly. In line with lower sales volumes and stagnant or slightly lower unit prices, the overall value of cement sales in 2002 declined by about 4% to about $8.25 billion. Based on typical portland cement mixing ratios in concrete, the delivered value of concrete, excluding mortar, in the United States was estimated to be at least $40 billion in 2002.

The top five cement-producing States in 2002, in descending order, were California, Texas, Pennsylvania, Michigan, and Missouri. Cement producers in the United States ranged widely in size and in the number of plants operated. Ranking companies in terms of output or capacity is made difficult by the existence of some common parents and joint ventures. If companies with common parents are combined under the larger subsidiary's name and if joint ventures are apportioned, then the top 10 companies at yearend 2002, in descending order of cement production, were Holcim (US) Inc.; Lafarge North America, Inc.; CEMEX, Inc.; Lehigh Cement Co.; Ash Grove Cement Co.; Essroc Cement Corp.; Lone Star Industries, Inc.; Texas Industries Inc. (TXI); RC Cement Co. (including Alamo Cement Co.); and California Portland Cement Co. The top 5 of these had about 52% of total U.S. production, and all 10 together accounted for about 77% of total U.S. production. All the companies listed except Ash Grove cement and TXI were foreign-owned as of yearend.

Consolidation in the international cement industry continued in 2002, with the most important change, from a U.S. standpoint, being that of Buzzi Unicem S.p.A. of Italy acquiring control of Dyckerhoff AG of Germany, in which Buzzi already held a substantial stake. As of yearend, however, the merger had not yet led to a consolidation of management or other activities of the respective companies' U.S. subsidiaries—RC Cement and Alamo Cement, both owned by Buzzi Unicem; and Lone Star Industries, including 50% of Glens-Falls Lehigh Cement, owned by Dyckerhoff. At yearend, Votorantim Cementos Ltda. of Brazil arranged to buy a 50% stake in Suwannee American Cement Co., a new plant that started up at yearend in Florida.

Early in the year, Cemex S.A. de C.V. of Mexico purchased Puerto Rican Cement Co., which operated an integrated plant in San Juan, PR. Also early in the year, Essroc purchased Riverton Investment Corp., which owned Capitol Cement Corp. (an integrated plant at Martinsburg, WV) and Riverton Corp. (a plant at Front Royal, VA, that manufactured lime and colored masonry cements). In December, Hanson PLC announced that it was finalizing the sale of its 50% share in North Texas Cement Co., LP to its joint-venture partner Ash Grove. The sale was to take effect in January 2003 and would be the first return of cement production capacity to U.S. ownership since the January 1998 purchase of Riverside Cement by TXI.

The bulk of this report is based on data compiled from the USGS canvass of cement and clinker manufacturing plants and associated distribution facilities and import terminals, some of which are not owned by U.S. cement manufacturers. For 2002, responses were received from 137 of 145 facilities canvassed, a response rate of 94%. Of the nonrespondents, only five were production sites. The respondent facilities accounted for about 97% of U.S. cement production and production capacity in 2002. In

contrast, for 2001, responses were received from 125 of 144 facilities canvassed, a response rate of 87%, accounting for about 90% of production and capacity. The nonrespondents in 2001 included 13 production facilities.

For missing forms and for cases where forms were returned incomplete, an attempt was made to obtain the missing information by telephone. For 2002, cement production data were thus obtained for all nonrespondents, hence the production statistics for 2002 have 100% reporting. For data other than production where follow-up inquiries were not successful and for which applicable data were not available from the monthly surveys, estimates were incorporated. A number of district and national totals have been rounded to reflect this incorporation of estimates. State totals are listed individually where possible or combined within districts where needed to protect proprietary data. In several tables, a few States (and, for consumption, two metropolitan areas) are shown subdivided; the county basis for these divisions is given in table 2.

Legislation and Government Programs

Economic Issues.—Government economic policies and programs affecting the cement industry are those affecting cement trade, interest rates, and public sector construction spending. In terms of trade, the major issue in 2002 continued to be that of antidumping tariffs against Japan and Mexico; in a 2000 sunset review judgment, these tariffs were ruled as still necessary. On March 14, 2002, the U.S. Department of Commerce released its determination for the 10th review period, covering August 1999 to July 2000, for gray portland cement and clinker from Mexico; the dumping margin for the period was set at 50.98% (Southern Tier Cement Committee, 2002).

The major Government construction funding program in 2002 remained the Transportation Equity Act for the 21st Century (TEA-21), passed in 1998, which authorized $216.3 billion in funding for the 6-year period from 1998 to 2003 to upgrade the country's transportation infrastructure. Although Federal public sector expenditures on highways increased since the passage of TEA-21, the increases have been below expectations, as have been the levels of cement consumption for this work. Various factors have affected the actual TEA-21 funding and consumption levels, including delays in or unavailability of State cofunding of projects, greater than anticipated lag times between project initiation and actual cement consumption, greater than anticipated work not requiring significant concrete, delays related to environmental issues, and overall project cost increases. Efforts were underway to reauthorize TEA-21 to ensure its continuation beyond 2003 and at higher expenditure levels (Cement Americas, 2002a).

Environmental Issues.—The production of portland cement involves components of mining and manufacturing. Most of the environmental issues relate to the manufacturing process; an overall review of this process and its associated environmental issues is provided in van Oss and Padovani (2002, 2003). The largest emissions from cement (actually clinker) manufacture are of carbon dioxide (CO_2), amounting to nearly 1 metric ton (t) of gas per metric ton of clinker, about one-half of which is derived from the calcination of calcium carbonate raw materials, and the rest, from the combustion of fuels. Overall, generation of CO_2 by the U.S. industry in 2002 amounted to about 77 Mt.

As of June 10, U.S. portland cement plants were required to be in compliance with the National Emission Standards for Hazardous Air Pollutants for Source Categories; Portland Cement Industry ("PC MACT") and was to be in compliance with the equivalent rule for hazardous waste combustors by September 30, 2003. Ellis (2003) provides a review of the salient provisions of these MACT rules and related environmental proposals and a brief overview of the administrative requirements of the PC MACT rule (Egan and Holt, 2002).

Production

Cement in 2002 was produced in 37 States and in Puerto Rico (tables 3, 4). The State count, unchanged from 2001, reflects the cessation of production in Hawaii in 2001 and the incorporation of data in 2002 for a new grinding plant, Badger Cement Products LLC in Milwaukee, WI. Badger Cement actually commenced operations in late November 2001, but output data remain unavailable for that year.

One new portland cement plant, Suwannee American Cement Co., fired up its kiln at yearend 2002, but clinker output (likely very small) and most other data for it were unavailable, and the facility is not included in this report's tabulations. The plant at Branford, FL, has a capacity of about 0.75 million metric tons per year (Mt/yr). Suwannee's cement sales were expected to commence in early 2003.

Several existing portland cement plants completed major capacity upgrades during the year. Lafarge had its first full year of production from the new finish mill installed at its 0.8-Mt/yr Sugar Creek, MO, facility in December 2001. The plant's existing long dry kilns were shut down in November 2001, and the new precalciner kiln was fired in April 2002 (Cement Americas, 2002b; Gaal, 2003). The new 4,400-metric-ton-per-day (t/d) kiln at Lafarge's Roberta plant in Calera, AL, was fired in March, and the plant's existing long dry kilns were closed at about the same time (Seymour, 2003). In October, Phoenix Cement started up its new 3,000-t/d kiln at its Clarkdale, AZ, plant. The facility's existing long dry kilns were shut down (Skroski, 2003). After 10 months of work to repair structural problems in the preheater tower, Holcim refired the new 1.9-Mt/yr kiln at the Portland plant in Florence, CO. The new line was first fired in August 2001 but was shut down shortly thereafter when structural defects were discovered in the tower. The company had intended to close its Fort Collins plant at LaPorte, CO, in 2001 but kept it running until repairs at the Portland plant were complete. The Fort Collins plant was shut down at the end of August (Cement Americas, 2002c). This was the only U.S. plant closure during 2002.

Giant Cement Holding, Inc. was planning to install a 3,000-t/d precalciner kiln to replace the wet kilns at its Harleyville, SC, plant. Work was planned to commence in 2003 and to be completed in 2004 (Cement Americas, 2002d). Continental Cement Co. announced plans to double the production capacity of its Hannibal, MO, plant to about 1.2 Mt/yr (Portland Cement Association, 2002). Dragon Products Co., Inc. was planning to replace the existing wet kiln with a 0.64-Mt/yr precalciner dry kiln at its Thomaston, ME, plant. Work was planned to commence in March 2003, with completion targeted for mid-2004 (International Cement Review, 2003).

Portland Cement.—Portland cement was manufactured in the United States in 2002 at a total of 114 plants plus 2 in Puerto Rico. As in 2001, the count excludes a facility in Florida that reported simply regrinding imported portland cement from one variety into another (i.e., the facility grinds no clinker). Of the U.S. plants, six were simply grinding facilities that relied entirely on clinker made elsewhere (primarily foreign). The distribution, by district, of portland cement plants, cement production, grinding capacities, and yearend cement stockpiles, is listed in table 3. Although this activity is not shown in the tables, some portland cement plants also grind GGBFS as a separate product.

In 2002, U.S. production of portland cement overall rose by 1.0% to about 85.3 Mt, a new record. District-level performances were evenly split between districts reporting production increases and those recording decreases (table 3). Most of the larger increases could be attributed to the recent (2000-2002) completion of capacity upgrades.

The overall grinding capacity rose by about 1% to about 108 Mt; however, grinding capacity utilization fell slightly (0.5%). The capacity utilization percentages in table 3 are relative to portland cement production, but if they are calculated on a total cement (including masonry) basis, then the utilization percentage in 2002 becomes 83.1%, essentially unchanged from that in 2001. Many cement plants have excess grinding capacity because it is relatively inexpensive to provide it. Also, the capacities listed in table 3 for some districts include reported clinker grinding capacity that is currently used to produce GGBFS. This is especially true in Florida, which shows a relatively low capacity utilization level. Some low utilization rates also reflect plant upgrades late in the year; the full new capacities are credited without commensurate full year production at the upgraded levels. In contrast to recent years, a number of districts showed capacity utilization rates in 2002 that were perhaps slightly below full practical operational levels. In at least some cases, these reflected slow market conditions, in which extended shutdowns for maintenance were authorized.

Data are not collected on the production of specific varieties of portland cement, but it may be presumed that production levels approximate the ratios among types of portland cement sold (table 16). On this basis, production of Types I and II (or hybrids thereof) accounted for about 86% of total portland cement output in 2002, down from about 88% in 2001. The Type I production decline, if real, appears to have been substantially offset by an increase in production (sales) of Type V portland cement. Part of this shift, however, may be explained by a switch in type assignation by some California producers that have a product that meets the specifications for both types; the USGS canvass does not offer a hybrid reporting category. Although total production of blended cements did not change significantly, the ratio among blended cements appears to have shifted, with a significant apparent increase in blends containing GGBFS and an offsetting decline in blends containing fly ash. The increase in production of GGBFS blends is in accord with an increase in consumption of GGBFS material for cement manufacture (table 6), although the ratio of slag to blended cement declined during the 2-year period shown from almost 54% to 49%. This ratio decline may reflect a "dilution" of the blends (which is unlikely) or some other use of slag in the finish mill (more information can be found in the "Raw Materials and Energy Consumed in Cement Manufacture" discussion below). In contrast, the relative amount of fly ash consumed for blended cement declined significantly less than the overall apparent tonnage of blended cement produced, suggesting an increase in the average content of fly ash within blended cement from 18% to about 29%.

Ideally, if sales data are to be used as a proxy for production ratios, then the sales ratios should be adjusted for the import component of sales. Imports are dominated by Types I and II portland cement but include significant volumes of Type V (mainly into southern California) and white cement. Unfortunately, there is no tariff code distinction among gray portland cement types.

Masonry Cement.—Overall production of masonry cement was essentially unchanged in 2002 at about 4.45 Mt and reflected the continued strong housing construction sector during the year (table 4). Changes in yearend stockpiles, likewise, were insignificant. Unlike portland cement, little if any masonry cement is imported; accordingly, production (adjusted for changes in yearend stockpiles) is almost identical to the consumption levels (as defined by shipments to final customers) in table 9. The data in both tables 4 and 9, however, underrepresent true production and consumption levels of masonry cement because it is common for masonry cement (particularly the portland lime variety) to be made at the jobsite from purchased portland cement and lime. There are no data on this jobsite activity, but apart from its influence, the large district-level percentage changes in 2001-02 masonry cement production evident in table 4 (generally much larger than the relative shifts in portland cement production) may be explained by the focus of masonry cement on the housing sector of the construction industry and the fact that the overall tonnages of masonry cement are very small by comparison to portland cement. Hence small tonnage shifts can equate to large percentage changes. In 2002, about 95% of the reported masonry cement continued to be indicated as having been made directly from clinker rather than from finished portland cement.

Clinker.—District-level data pertaining to clinker are given in table 5; the production data therein represent 100% reporting, whereas some of the other data contain estimates. Production of clinker in 2002 reached a new record of 81.5 Mt, up by 3.9%. In descending order, California, Texas, Pennsylvania, Missouri, and Alabama were the top five clinker-producing States in 2002. The rankings are unchanged from the previous year except that Michigan was fifth in 2001. Only six districts showed clinker production decreases, and of these, only four had declines in excess of 50,000 t. The two largest declines (Michigan and the Georgia-Virginia-West Virginia district) appear to be largely weather related. About a dozen districts showed clinker production increases in excess of 50,000 t, while the remaining districts showed smaller increases. As with portland cement production, a number of the larger State-level increases could be related to recent plant upgrades.

In 2002, clinker was produced by a total of 110 integrated cement plants operating 195 kilns (down by 11); 2 of these plants and kilns were in Puerto Rico. Of the total, 80 plants were dry process facilities (including 1 semidry facility in Indiana). The number of wet process plants dropped by 1 to 27, reflecting the 2001 closure of the Kosmos cement plant in western Pennsylvania. The number of plants shown as operating both wet and dry kilns (combination plants) declined by three in 2002, with a corresponding increase in dry plants. The decline in combination plants represented facilities that completed new dry kiln lines in 2001 but which also had part-year production from obsolete wet kilns that were subsequently closed later that year.

Annual clinker capacity and capacity utilization statistics are highly sensitive to reported kiln shutdown periods, specifically those for routine maintenance. This downtime sensitivity means that changes of a few percentage points in regional annual clinker production capacity or capacity utilization rates have little statistical significance. Given that a plant generally has a total downtime in excess of that for routine maintenance, a capacity utilization rate of 85% or higher indicates that the facility is probably running at, or close to, full practical capacity; likewise for district-level utilization rates. A utilization rate below this could indicate the temporary idling of kilns or the permanent closure of old kilns following successful startup of new ones; as long as a kiln was active for 1-day or more during the year, its capacity will be included in the data in table 5. Apparent clinker capacity in 2002 increased slightly (0.6%) to 99.0 Mt/yr. Overall capacity utilization rose by almost 3% to about 82%, but quite a few districts showed overall utilization rate decreases. As with cement, some of these decreases were attributable to extended maintenance periods that had been authorized under slow market conditions.

Based on the data in table 5, average plant clinker capacity in 2002 was about 0.92 Mt/yr, up by about 2%, and average kiln capacity was 0.51 Mt/yr, up by about 7%. Plants operating only dry process kilns in 2002 produced almost 78% of the total clinker, up from about 75% the previous year (table 7). Wet kiln plants accounted for 17.6%, down from the 18.5% in 2001. Combination plants accounted for just 4.5% of the clinker compared with 6.3% in 2001; the 2001 figure, however, included three facilities listed as dry plants in 2002. Yearend stockpiles of clinker rose by about 24% to about 5.6 Mt, an apparent buildup[1] that, along with reduced levels of clinker imports (tables 1 and 22), reflected the lower overall levels of cement consumption during the year.

Raw Materials and Energy Consumed in Cement Manufacture.—The differentiation between raw materials consumed for clinker manufacture and those added in the finish mill to make cement is primarily of environmental interest. Materials used to make clinker are burned in the kiln and are associated with various chemical changes and emissions, whereas those used in the finish mill are just ground. The amounts of nonfuel raw materials consumed to make cement and clinker are listed in table 6. About 1.7 t of nonfuel raw materials is needed to make 1 t of clinker, and about the same ratio holds through to the final (portland) cement product. Limestone or other calcareous materials account for about 85% or more of the total raw materials needed to make cement and clinker.

Overall, the major ratios among raw materials types did not change appreciably in 2002. Some of the specific changes seen may reflect improved reporting rather than a net change in true consumption. Also, some materials may be classified somewhat differently from year to year or among plants; for example, one plant's limestone might be another's marble. The chemical grouping of materials under terms like "calcareous" and "siliceous" is somewhat arbitrary because many of the raw materials contain both. The cement kiln dust data for both years remain significantly underrepresented because few plants routinely measure consumption of this material; the apparent increase in consumption for clinker in 2002 thus likely reflects improved reporting. The changes in 2002 among slag varieties probably include a component of classification error by some plants.

Among the siliceous raw materials, the ratio between the consumption of certain pozzolans or other cementitious additives and the corresponding sales (as a proxy for production) of blended cements listed in table 16 appears to be out of balance. In particular, the amount of GGBFS consumed by the cement industry in recent years has included both material for blended cement and that for use as a grinding aid to make ordinary grades of portland cement; the latter is evident for survey respondents reporting GGBFS consumption but no sales of blended cement. In 2002, the consumption of GGBFS for cement increased by 23% but, as noted in the "Production—Portland Cement" section above, there was a decline in 2002 in the ratio of GGBFS slag consumed to the corresponding blended cement sales. It is more likely that this reflects a reduction in the use of slag as a grinding aid rather than a decrease in the average GGBFS content of blended cements. It is important to note that the overall consumption of GGBFS by the cement industry is only about 10% to 15% of that consumed directly by the concrete industry for use as a partial substitute for portland cement in concrete mixes.

The amount of fly ash consumed for cement declined by almost 9% but increased relative to the sales of fly ash blended cements, as noted earlier. This appears to reflect an increase in the average fly ash content of the blended cements made with it. Fly ash consumed as raw material for clinker increased significantly in 2002. As with GGBFS, the concrete industry consumes far more fly ash (about 11 Mt), again as a partial substitute for portland cement, than does the cement industry (American Coal Ash Association, 2001).

Cement plants generally are able to switch among a variety of primary fuel types, and many routinely burn a mix of fuels. The overall mix of fuels consumed by the cement industry is given in table 7. The major decline in coke (from coal) consumption in 2002 and increase in petroleum coke reflects improved reporting; in previous years, it is likely that much of the coke was improperly reported as petroleum coke. The decline in wet plant consumption of fuel oil may have been offset by part of the increase in consumption of liquid wastes; the latter commonly include off-specification fuel oil, and such may be variously reported under fuel oil or as a waste fuel. Overall, however, it is difficult to evaluate shifts among fuel type tonnages.

[1]Yearend stockpiles of clinker are an artifact of data collection conveniences rather than reflecting true market conditions or production capacity. Generally, a plant will try to build up its stocks of clinker prior to scheduled extended kiln shutdowns so as to provide continuity of clinker feed to the finish (cement) mill. These shutdowns can happen any time of year.

Although not shown in table 7, the USGS annual survey also queries the heat energy realized for the fuels. Unit heat contributions of fuels, particularly those that are fluids and/or waste fuels, are subject to a number of reporting errors, and thus, the relative heat contributions of different fuels can only be determined to an approximate degree; changes of less than 5% are probably statistically insignificant. In 2002, coal accounted for about 68% of the total heat contribution compared with 71% in 2001. Coke and petroleum coke contributed about 16% of the heat compared with 15% the previous year. Fuel oil and natural gas, both primarily used for kiln warm-up, accounted for about 5.6% of the heat in 2002 and 4.8% in 2001; both fuels are also subject to significant reporting errors in terms of weight. Waste fuels, combined, accounted for 9% of total heat requirements in 2002 and 9.5% in 2001. Of the wastes, the contribution of tires was unchanged at 2.5% of total heat. Solid wastes contributed almost 1% of total heat in 2002 and about 1.7% in 2001. Although the tonnage of solid wastes is not prone to large reporting errors, the identification of the type of wastes tends to lack specificity because a wide variety of wastes can be burned as a mix, and the heat content of the solid waste fuel is thus subject to significant error. Liquid wastes contributed almost 6% of total heat in 2002 and about 5% in 2001; specificity of fuel type is also a problem with this category of fuels.

Wet plants accounted for 25% of the total heat requirements in 2002; dry plants, 68%; and combination plants, 7%. Overall, heat consumption in 2002 averaged about 4.4 million British thermal units per metric ton (MBtu/t) of clinker compared with 4.6 MBtu/t in 2001. Wet plants in 2002 averaged 6.2 MBtu/t, and dry plants, 3.9 MBtu/t; the corresponding individual plant-level breakout for 2001 has not been computed.

As in past years, dry process plants had a higher average electricity consumption per ton of product than wet process plants (table 8). This reflects the complex array of fans and blowers associated with modern dry kilns. The average unit consumptions for wet and dry plants were significantly unchanged in 2002. The increase shown for the remaining combination plants reflects the transfer of three modern facilities, temporarily in the combination category in 2001, into the dry category for 2002. The increase in unit electricity consumption for grinding plants followed increases in 2001 and 2000 and likely represents increased output of GGBFS from some of these facilities; GGBFS is harder to grind and is typically ground finer than clinker.

Consumption

Apparent consumption of portland and masonry cement, a calculated statistic, is listed in table 1 and fell by 2.5% to about 110 Mt in 2002. The measure of consumption preferred by the cement industry for its market analyses, however, is that of cement shipments to final customers (i.e., sales). The definition of "final customer" is left to the reporting cement producer but is generally understood to include concrete manufacturers, building supply dealers, construction contractors, and others (for example, the categories listed in table 16). The shipment data are published monthly by the USGS and are summed in this annual report in tables 9 and 10; the 2002 data incorporate all revisions to past data available through the June 2003 reporting cycle.

Significant tonnage differences (up to several million tons) existed in some past years between the annual U.S. sales totals derived from annual canvasses for portland cement listed in tables 1 and 11-16 and the monthly-survey-based totals listed in tables 9 and 10. The differences likely pertained to shipments (mainly of imported cement) by terminals that were missed by the annual forms but which were captured on the monthly surveys; the monthly surveys are commonly submitted on company-consolidated bases. The annual reporting protocols have been modified, and the discrepancy has now (2001-2) become insignificant. Past masonry cement data, in contrast, have tended not to show significant discrepancies between the monthly and annual reporting, largely because little of this material is imported.

Superficial similarities between table 9 and tables 12 and 13 belie key differences in their component data. The most important difference is that table 9 shows the shipment destinations and so directly reveals the location and amounts of consumption. In contrast, the regional data in tables 12, 13, and 15 pertain to the location of the reporting entity (chiefly, the production sites), not the location of consumption. Accordingly, certain States in tables 12 and 13 are grouped into districts for proprietary protection reasons, and most nonproducing States are not present at all. It is very common for shipments to cross State lines; where a State in table 9 shows a higher tonnage than the same State in tables 12 or 13, the State is a net importer of cement. Where the higher tonnage is in table 12 or 13, the State is a net exporter of cement.

In 2002, domestic portland cement consumption fell by 4% to 103.9 Mt, the first decline since 1991. Imported portland cement accounted for about 18% of total sales (including Puerto Rico) in 2002, down from about 20% in 2001. Total imports of both cement and clinker fell (tables 18, 22). The drops in imports reflected higher domestic cement and clinker production capacity and excess production in some regions (tables 3, 4). This was further reflected in the growth in yearend cement and clinker stockpiles. Overall monthly portland cement consumption levels in 2002 were lower than those in 2001 for all months except January, February, and September. The early year performance was owing to a mild 2001-02 winter, but the rest of the year's declines generally reflected the weak national economy. This was aggravated by severe weather from October onwards. As with production, masonry cement consumption in 2002 was essentially unchanged.

On a State basis, strong increases (50,000 t or more) in portland cement consumption were seen in 2002 only in southern California, Florida, eastern New York, Oregon, and possibly southern Texas. The qualifier on southern Texas in 2002 related to the fact that one major company had prior to midyear reported (erroneously) most of its Texas sales into the northern one-half of the State and corrected data were unavailable; overall consumption in Texas declined. Most States showed either strong declines in consumption or had relatively stagnant (changes of less than 50,000 t) consumption levels, although even small tonnage shifts can equate to large percentage changes in small consumption States. Some of the largest decreases were seen in the South Atlantic States, where some producers reported temporary shutdown of production, the Gulf Coast, and the Great Lakes region. The top 10 consuming States, in

descending order, were California, Texas, Florida, Illinois, Ohio, Pennsylvania, Arizona, New York, Michigan, and Georgia. The top 5 States accounted for 39.1% of the national consumption total, and the top 10 accounted for 54.5% of the total.

Cement is a key construction material, and it may be expected that cement consumption levels will broadly reflect levels of construction spending, although there can be significant time lags between the onset or cutoff of spending and the consumption of cement or concrete. Lag times are particularly noticeable in sectors involving individual projects requiring high tonnages of concrete (for example, large office buildings and major public sector projects). According to U.S. Census Bureau data quoted by the Portland Cement Association (2003), overall construction spending levels in 2002 declined by 1.7% to $692.7 billion (constant 1996 dollars). Most of the spending decline was seen in nonresidential private buildings, spending for which fell by 17.8% to $136.9 billion overall, but was especially weak for industrial and office buildings (down by about 45% and 28%, respectively). Owing to continued very low mortgage and general interest rates, residential construction spending increased by 4.4% to $336.5 billion. Public sector construction increased by 3.6% to $167.9 billion, but much of the increase was in buildings; the important road category fell by 2.4% to $44.3 billion. Sewer construction increased by 5.1% to $8.2 billion, which correlates well with the trend in housing construction.

Another way of linking construction spending and cement consumption is to calculate the cement "penetration rate," which can be defined as the tonnage of cement consumed per $1 million in spending. Many variables affect this type of analysis, especially the distribution of spending among different types of construction; changes in penetration rates can reflect cost or performance advantages of concrete over competing construction materials, promotional efforts by the concrete industry, shifts in spending between new construction and repairs to existing infrastructure, lag times between construction spending and concrete consumption, and underreported cement consumption because of partial substitution in concrete mixes of portland cement by other cementitious materials. Using the apparent consumption data in table 1, the overall construction spending data show a generally increasing trend in penetration rates for 1998 to 2002; $1 million in construction spending bought, in chronological order, 155.5 t in 1998; 156.8 t in 1999; 155.3 t in 2000; 160.1 t in 2001; and 158.8 t in 2002.

Cement Customer Types.—Data on portland cement usage are collected on the basis of the types of customers to whom the cement is sold rather than the direct application itself (table 15). The distinction is that a customer, although classified in one category, may in fact use cement in more than one way. This data set includes a high proportion of estimates, many by the companies themselves, and likely understates consumption in the smaller user categories. As in past years, the dominant customers for cement are the ready-mixed concrete producers.

Types of Portland Cement Consumed.—Sales to final customers of varieties falling within the broad definition of portland cement are listed in table 16. In 2002, Types I and II combined accounted for almost 86% of total portland cement sales, a proportion similar to that in 2001 and recent years. Sales of white portland increased by 9.4%, likely reflecting the continued strong housing construction market. Type V sales increased by 50%, but the tonnage increase appears to offset much of the decline in Types I and II cement, and although part of this could be a shift related to strong consumption in southern California (a major market for Type V), most of the offset is more likely due to a simple reclassification by some California producers of their Types I and II (especially the later) cements to Type V based on their actual sulfate-resistance properties. Blended cement sales, overall, did not change significantly, but there were significant relative shifts in sales of blends containing GGBFS and fly ash, as discussed in the "Production" section. As noted earlier, most of the pozzolans and other cementitious additives are consumed directly by the concrete producers, not by the cement industry.

Prices

Data are collected by the USGS on the total and/or unit mill net values for shipments to final customers by plants and import terminals (terminal nets); the data are listed in tables 12 to 14. The values are not specific as to type of cement (for example, Type I vs. Type V portland); the values thus cannot be equated to prices, although they are broadly similar. Separate valuations are provided by each respondent for gray portland cement (all varieties combined), white portland cement, and masonry cement; however, in orer not to reveal proprietary data, the values for white portland cement are revealed only for the national totals in table 14 and for imports in table 21; elsewhere they are combined with gray portland cement (table 12). The value data make no distinction between bulk and container (bag or package) shipments; however, container shipments would be expected to have higher unit values.

Values are a data category that contains a high percentage of estimates. For gray portland cement, value estimates for 2002 were made for 11% of the facilities canvassed, including nonrespondents and facilities that declined to provide data; the estimated fraction in 2001 was 21.5% of facilities. However, even where provided to the USGS, many of the value data appear to be company estimates, and it is evident that there is not complete uniformity in how companies calculate their mill net values. For example, onward shipping costs to terminals and/or customers are not supposed to be included, and bagging charges are supposed to be included. Likewise, as the U.S. cement industry consolidates, there is increasing centralization of marketing functions, and production site personnel are thus increasingly divorced from data related to sales. Accordingly, even where they appear to be unrounded, all value data in this report should be taken as being estimated to at least some degree, and the values are better viewed as price indices for cement, suitable for crude comparisons among regions and over time. Value shifts of less than $0.50 per metric ton are probably of no statistical significance. Unit value shifts can reflect changes in actual unit prices within a region, changes in supply sources (for example. imports), changes in the type(s) of cement sold, and changes in the mix of bulk and container sales.

With the above caveats, the average mill net value of portland cement in 2002 was about $74.50 per ton, down slightly; total portland cement shipments were worth about $7.8 billion (table 12). The decline followed a larger drop in 2001, which was the first year showing lower unit values since 1992. The sales listed in table 12 are inclusive of white portland cement. The average unit

values for gray portland and white portland cements are listed in table 14. The value data for white cement should be viewed with caution because there are only a few producers and importers of this product, and a significant share of white cement sales to final customers are as resales by gray cement companies. Additionally, white cement includes a larger component of relatively costly package shipments, of imported material, and of estimated values. Thus, the small increase in the white cement unit value in 2002, if real, may not be statistically significant. A discussion of prices for imported white cement is given in the "Foreign Trade" section. In (1998) constant dollar terms, overall portland cement prices have dropped since 1998. This has constrained profit margins, especially in the face of increasing fuel prices.

The average mill net value in 2002 for masonry cement was $108.00 per ton, an increase of just $1 per ton (probably not statistically significant). The total value of sales declined slightly to $476 million. It should be noted, however, that the mill net values for masonry cement contain more component estimates than those for portland cement, and for a number of respondents, the masonry cement mill net values appear to have been reported on a bulk-equivalent basis instead of being inclusive of bagging charges.

For most States, the unit values for portland cement did not change very much, although large declines were seen for portland cement sales by producers in Alabama, and in the Kentucky, Mississippi, Tennessee district (most of these States also had declines in cement consumption, though not to an exceptional degree).

The unit values in tables 12 and 13 are free on board (f.o.b.) at the plant. A crude estimate of delivery costs (to the customer) can be made by comparison to the U.S. 20-city average delivered cement prices (for Type I portland and masonry cements) reported monthly by the journal Engineering News-Record. For 2002, the monthly U.S. average Type I delivered price calculates to an average for the year of $90.73 per ton, suggesting an average delivery cost of about $16 per ton. This differential is higher than those of recent past years (i.e., about $14.50 per ton in 2001 and $12 per ton in 2000) and likely reflects higher fuel costs. For masonry cement, the Engineering News-Record average price for 2002 was almost $170 per ton (converted from prices per 70-pound bag); the large delivery differential appears to incorporate a variety of handling charges for this mainly bagged commodity.

Foreign Trade

Trade data from the U.S. Census Bureau are given in tables 17 to 22. Exports of hydraulic cement and clinker increased in 2002 but, except for sales to Canada, continued to be insignificant (tables 1, 17). Almost all exported material was cement.

Overall imports of cement and clinker declined significantly in 2002. Gray portland cement imports (including those into Puerto Rico) amounted to 21.3 Mt, down by 6.7% (table 20). Canada continued to be the largest source of imports, although its shipments into the United States fell by 1% in 2002. This modest decline reflects the fact that Canada serves a number of markets in the United States that, for the most part, are relatively insulated from competition from sources in other countries. Imports of gray portland from Thailand grew by 15.5%, with much of the growth appearing to be at the expense of imports from China. Overall import prices for gray portland cement were relatively unchanged in 2002. Imports of white cement appear to have fallen by 7.4%, which is in contrast to the increase in sales (tables 16, 21). The volume of white cement imports in recent years has appeared excessive given the volume of sales and the capacities of the three white cement plants in the United States. There are two main reasons for the apparent excess, which likely isn't real. First, white cement imports likely include material that gets incorporated into colored portland cements and various masonry cements (the latter are not included in table 16). Second, for a number of country entries in table 21, the unit values appear to be too low [less than $90 per ton cost, insurance, and freight value (c.i.f.)] to be white cement, indicating that the entries are or include a significant proportion of gray portland cement. This misreporting happens when importers erroneously use the white cement tariff number on their customs declarations, an easy mistake to make. The unit value of material from Venezuela is so low that it is likely to be misreported clinker.

Clinker imports appear to have fallen by 10% to just 1.6 Mt (table 22); the data have been corrected to remove "clinker" coming into Honolulu, HI, after March 2001, as this later material was actually gray portland cement. The decline in total (remaining) clinker imports appears to reflect the increase in domestic clinker production capacity, but the extent of this linkage is uncertain. This is because most imported clinker is used at grinding plants that almost exclusively use imported material. Further, although not revealed in table 22, clinker coming into the Seattle district is inadequate to service the grinding plant in Washington; the data for this district appears to be incomplete. Clinker coming into Michigan in 2002 appears to be insufficient to service the two large, import-dependent grinding plants in that State; it is likely that some clinker for these plants is being assigned a gray portland cement tariff code. Unit import values for clinker generally are lower than for gray portland cement. Where table 22 shows very high unit values, the material is likely to be for something other than for portland cement manufacture. For example, the material from France has an average unit value (c.i.f.) of $182.2 per ton and is almost certainly aluminous cement clinker.

World Review

The world hydraulic cement production data listed in table 23 were derived from data collected by USGS country specialists from a variety of sources. The data for some countries may include their exports of clinker. Although the data are supposed to include all forms of hydraulic cement, the data for the United States are for portland plus masonry cement only, and the data for some other countries also may not be all-inclusive. World hydraulic cement production increased by about 4% in 2002 to an estimated 1.8 Gt.

More than 150 countries had cement production during the year, although production was very unevenly distributed among them. In terms of country rankings in 2002, China was overwhelmingly the largest cement producer with a preliminary reported production of almost 704.7 Mt, or about 39% of the world total. The remaining top 15 countries, in descending order, were India, the United

States, Japan, the Republic of Korea, Spain, Italy, Brazil, Russia, Indonesia, Turkey, Thailand, Mexico, and Iran and Germany (tied). Cumulatively, the top 5 countries had almost 57% of total world output; the top 10 countries, almost 68%; the top 15 countries, about 76%; and the top 20 countries, almost 82%. Regionally, Asia contributed about 60.5% of world production and included 8 of the top 20 producers. Western Europe had about 11.1% of total output; North America, about 7.5%; the Middle East (including Turkey), about 6.5%; Central America and South America, about 4.8%; Africa, about 4.2 %; the Commonwealth of Independent States, about 3.2%; and Eastern Europe, 2.1%.

Outlook

The continued weakness in the U.S. economy augured poorly for cement consumption in 2003, which was likely to decline by 2% to 5%, depending on the severity of the winter, the amount of rainfall overall, and assuming continued low interest rates. Although reauthorization of TEA-21 funding for highway projects was likely, it is expected that States will continue to have difficulty cofunding the projects, which will constrain public sector use of cement and concrete. Medium-term cement consumption beyond 2003 is expected to be stagnant to only slightly increasing (1% to 2% per year growth); a factor in this and in long-term growth will be the degree to which suppliers of GGBFS, fly ash, and other cementitious products can displace portland cement in concrete mixes. Significant additional new cement production capacity is slated to come onstream during the next few years, which is expected to displace some imports. It was likely that ownership consolidation of the U.S. industry would continue.

References Cited

American Coal Ash Association, 2001, 2001 coal combustion product (CCP) production and use: Aurora, CO, American Coal Ash Association fact sheet, 2 p.
Cement Americas, 2002a, TEA-21 reauthorization proposals introduced: Cement Americas, November/December, p. 2.
Cement Americas, 2002b, Lafarge dedicates new Sugar Creek plant: Cement Americas, September/October, p. 2.
Cement Americas, 2002c, Holcim to close Fort Collins plant: Cement Americas, September/October, p. 5.
Cement Americas, 2002d, Giant plans $100 million Harleyville overhaul: Cement Americas, September/October, p. 2.
Egan, J.P., and Holt, S.P., 2002, Plugging the holes: Cement Americas, January/February, p. 4-6.
Ellis, Scott, 2003, Environmental update for the cement industry: Cement Americas, May/June, p. 12-17.
Gaal, Charlie, 2003, Up and running: World Cement, v. 35, no. 5, May, p. 47-52.
International Cement Review, 2003, North American cement projects: International Cement Review, May, p. 30-32.
Portland Cement Association, 2002, Cement industry updates: Monitor, v. 12, no. 1, January, p. 2.
Portland Cement Association, 2003, Construction put in place: Monitor, v. 13, no. 6, December, p. 16.
Seymour, David, 2003, Revamping Roberta: International Cement Review, June, p. 81-84.
Skroski, Richard, 2003, Phoenix rising: World Cement, v. 35, no. 5, May, p. 55-56.
Southern Tier Cement Committee, 2002, Commerce Department determines high dumping margin on cement imports from Mexico for tenth consecutive year: Washington, DC, King & Spaulding press release, March 14, 2 p.
van Oss, H.G., and Padovani, A.C., 2002, Cement manufacture and the environment—Part I—Chemistry and technology: Journal of Industrial Ecology, v. 6, no. 1, p. 89-105.
van Oss, H.G., and Padovani, A.C., 2003, Cement manufacture and the environment—Part II—Environmental challenges and opportunities: Journal of Industrial Ecology, v. 7, no. 1, p. 93-126.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Cement. Ch. in Mineral Commodity Summaries, annual.
Cement. Mineral Industry Surveys, monthly.

Other

Cement. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
Cement Americas, bimonthly.
Cement Americas, North American Cement Directory. Intertec Publishing, annual.
Concrete Products, monthly.
Engineering News-Record, weekly.
International Cement Review, monthly.
Portland Cement Association:
  The Monitor, monthly.
  U.S. and Canadian Portland Cement Industry, Plant Information Summary, annual.
Rock Products, monthly.
World Cement, monthly.
World Cement Directory. The European Cement Association, 2002.
Zement-Kalk-Gyps International, monthly.

TABLE 1
SALIENT CEMENT STATISTICS[1]

(Thousand metric tons unless otherwise specified)

		1998	1999	2000	2001	2002
United States:[2]						
Production:						
Cement[3]		83,931	85,952	87,846	88,900	89,732
Clinker		74,523	76,003	78,138	78,451	81,517
Shipments from mills and terminals:[4, 5]						
Quantity		96,857	103,271	105,557	112,510	108,500
Value[6]	thousands	$7,404,394 [7]	$8,083,247 [7]	$8,292,625 [7]	$8,600,000	$8,250,000
Average value[8]	dollars per metric ton	$76.45 [7]	$78.27 [7]	$78.56 [7]	$76.50	$76.00
Stocks at mills and terminals, yearend		5,393	6,367	7,566	6,600	7,680
Exports[9]		743	694	738	746	834
Imports for consumption:						
Cement[10]		19,878	24,578	24,561	23,694 [r]	22,198
Clinker		3,905	4,164	3,673	1,782 [r]	1,603
Total[11]		23,783	28,742	28,234	25,475	23,801
Consumption, apparent[12]		103,457	108,862	110,470	112,810 [r]	110,020
World, production[e, 13]		1,540,000 [r]	1,600,000	1,650,000 [r]	1,730,000 [r]	1,800,000

[e]Estimated.

[1]Portland and masonry cements only unless otherwise indicated. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Excludes Puerto Rico.

[3]Includes cement produced from imported clinker.

[4]Includes imported cement and cement produced from imported clinker. Includes sales by import terminals.

[5]Shipments are to final domestic customers. Data are based on annual survey of individual plants and terminals and may differ from data in tables 9 and 10, which are based on consolidated monthly shipments data from companies.

[6]Value at mill or import terminal of portland and masonry cement shipments to final domestic customers.

[7]Although presented unrounded, the data contain estimates for survey nonrespondents.

[8]Total value at mill or import terminal of cement shipments to final customers divided by total tonnage sold.

[9]Portland, masonry, and other hydraulic cements, plus clinker.

[10]Hydraulic cement, all types.

[11]Data may not add to totals shown because of independent rounding.

[12]Production (including that from imported clinker) of portland and masonry cement plus imports of hydraulic cement minus exports of cement minus change in stocks.

[13]Total hydraulic cement. May incorporate clinker exports for some countries.

TABLE 2

COUNTY BASIS OF SUBDIVISION OF STATES IN CEMENT TABLES

State subdivision	Defining counties
California, northern	Alpine, Fresno, Kings, Madera, Mariposa, Monterey, Tulare, Tuolumne, and all counties farther north.
California, southern	Inyo, Kern, Mono, San Luis Obispo, and all counties farther south.
Chicago, metropolitan	Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will Counties in Illinois.
Illinois	All counties other than those in metropolitan Chicago.
New York, eastern	Delaware, Franklin, Hamilton, Herkimer, Otsego, and all counties farther east and south, excepting those within Metropolitan New York.
New York, western	Broome, Chenango, Lewis, Madison, Oneida, St. Lawrence, and all counties farther west.
New York, metropolitan	New York City (Bronx, Kings, New York, Queens, and Richmond), Nassau, Rockland, Suffolk, and Westchester.
Pennsylvania, eastern	Adams, Cumberland, Juniata, Lycoming, Mifflin, Perry, Tioga, Union, and all counties farther east.
Pennsylvania, western	Centre, Clinton, Franklin, Huntingdon, Potter, and all counties farther west.
Texas, northern	Angelina, Bell, Concho, Crane, Culberson, El Paso, Falls, Houston, Hudspeth, Irion, Lampasas, Leon, Limestone, McCulloch, Reeves, Reagan, Sabine, San Augustine, San Saba, Tom Green, Trinity, Upton, Ward, and all counties farther north.
Texas, southern	Brazos, Burnet, Crockett, Jasper, Jeff Davis, Llano, Madison, Mason, Menard, Milam, Newton, Pecos, Polk, Robertson, San Jacinto, Schleicher, Tyler, Walker, Williamson, and all counties farther south.

TABLE 3

PORTLAND CEMENT PRODUCTION, CAPACITY, AND STOCKS IN THE UNITED STATES, BY DISTRICT[1]

(Thousand metric tons unless otherwise specified)

	2001					2002				
			Capacity[2]		Stocks			Capacity[2]		Stocks
District[3]	Active plants	Production[4]	Finish grinding	Percentage utilized[5]	at yearend[6]	Active plants	Production[4]	Finish grinding	Percentage utilized[5]	at yearend[6]
Maine and New York	5	3,250 [7]	4,150 [7]	78.2 [7]	260 [7]	5	3,098	4,200 [7]	73.8 [7]	278 [7]
Pennsylvania, eastern[8]	7	4,866	5,374	90.5	312	7	4,665	5,311	87.8	326
Pennsylvania, western	4	1,670 [7]	2,540 [7]	65.7 [7]	120 [7]	3	1,460	1,724	84.7	156
Illinois	4	2,869	3,769	76.1	176	4	2,771	3,408	81.3	188
Indiana	4	2,903	3,493	83.1	244	4	2,935	3,502	83.8	278
Michigan and Wisconsin[9]	5	5,920 [7]	7,930 [7]	74.7 [7]	380 [7]	6	5,579	7,950 [7]	70.2 [7]	425
Ohio	2	1,037	1,497	69.3	60	2	1,024	1,497	68.4	58
Iowa, Nebraska, South Dakota	5	4,365	5,393	80.9	272	5	4,446	5,557	80.0	454
Kansas	4	1,830 [7]	2,320 [7]	78.8 [7]	110 [7]	4	2,352	3,100 [7]	75.9 [7]	204 [7]
Missouri	5	4,715	5,312	88.8	493	5	4,816	5,731	84.0	556
Florida[8, 10]	6	4,055	7,040 [7]	57.6 [7]	420 [7]	6	3,949	6,680 [7]	59.1 [7]	383 [7]
Georgia, Virginia, West Virginia	4	2,918	4,619	63.2	188	4	2,781	4,621	60.2	202
Maryland	3	1,718	2,321	74.0	149	3	1,880	2,420 [7]	77.7 [7]	193 [7]
South Carolina	3	2,555	3,406	75.0	83	3	2,508	3,406	73.6	150
Alabama	5	4,480 [7]	5,040 [7]	88.9 [7]	220 [7]	5	4,544	5,438	83.6	345
Kentucky, Mississippi, Tennessee	4	2,990 [7]	3,630 [7]	82.4 [7]	190 [7]	4	3,004	3,489	86.1	365
Arkansas and Oklahoma	4	2,650 [7]	3,160 [7]	83.9 [7]	190 [7]	4	2,498	3,230 [7]	77.3 [7]	194 [7]
Texas, northern[8]	6	5,793	7,581	76.4	373	6	5,955	7,044	84.5	423
Texas, southern	5	4,560 [7]	4,850 [7]	93.9 [7]	220 [7]	5	4,592	5,452	84.2	247
Arizona and New Mexico	3	2,189	2,638	83.0	120 [7]	3	2,270	3,035	74.8	136
Colorado and Wyoming	4	2,020 [7]	2,450 [7]	82.4 [7]	120 [7]	4	2,145	2,520	85.1	96
Idaho, Montana, Nevada, Utah	7	2,972	3,669	81.0	282	7	2,874	3,584	80.2	321
Alaska and Hawaii	1	112	288	39.1	64	--	--	--	--	51
California, northern	3	2,687	2,880	93.3	171	3	2,594	2,880	90.1	182
California, southern[8]	8	7,382	8,902	82.9	355	8	8,572	10,227	83.8	374
Oregon and Washington	4	1,947	2,500 [7]	78.0 [7]	190 [7]	4	1,970	2,432	81.0	163
Independent importers, n.e.c.[11]	--	--	--	--	350	--	--	--	--	466 [7]
Total or average[12]	115	84,450 [13]	107,000 [r, 13]	79.1 [13]	6,110 [13]	114	85,283	108,000 [7]	78.7 [7]	7,170
Puerto Rico	2	1,546	2,156	71.7	73	2	1,534	2,160 [7]	71.1 [7]	75 [7]
Grand total or average[12]	117	86,000 [7, 13]	109,000 [r, 7, 13]	79.0 [7, 13]	6,190 [7, 13]	116	86,817	111,000 [7]	78.6 [7]	7,250 [7]

[r]Revised. -- Zero.

[1]Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Reported annual grinding capacity is based on fineness necessary to grind individual plants' normal product mixes including masonry cement, making allowance for downtime requiring routine maintenance.

[3]District assignation is the location of the reporting facilities. Includes independent importers for which regional assignations were possible.

[4]Includes cement produced from imported clinker.

[5]Calculated based on portland cement output.

[6]Includes imported cement. Includes mills and terminals.

[7]Data, even when they appear to be unrounded, contain estimates for nonrespondent or incompletely reporting facilities.

[8]Includes data for white cement.

[9]Data for 2001 are for Michigan only.

[10]Plant count excludes one plant that reported cement (clinker) grinding capacity but no output of portland cement.

[11]Data include only those importers for which regional assignations were not possible.

[12]Data may not add to totals shown because of independent rounding.

[13]Data exclude one small grinding plant that commenced operations late in the year in Wisconsin.

TABLE 4

MASONRY CEMENT PRODUCTION AND STOCKS IN THE UNITED STATES, BY DISTRICT[1]

(Thousand metric tons unless otherwise specified)

	2001			2002		
District[2]	Active plants	Production[3]	Stocks at yearend[4]	Active plants	Production[3]	Stocks at yearend[4]
Maine and New York	4	130 [5]	10 [5]	4	116	8 [5]
Pennsylvania, eastern	6	239	43	6	247	51
Pennsylvania, western	4	90 [5]	10 [5]	3	94	11 [5]
Indiana	4	W	53	4	W	W
Michigan	5	290 [5]	40 [5]	5	292	50
Ohio	2	74	13	2	85	17 [5]
Iowa, Nebraska, South Dakota	2	W	W	2	W	W
Kansas	2	25	15	2	W	W
Missouri	2	111	23	2	W	W
Florida	5	556	37	5	591	34
Georgia, Virginia, West Virginia	5	318	32	5	343 [5]	33 [5]
Maryland	3	77	14	2	W	W
South Carolina	3	487	39	3	426	22
Alabama	4	380	58	4	380	75
Kentucky, Mississippi, Tennessee	3	80 [5]	10 [5]	3	83	13
Arkansas and Oklahoma	4	130 [5]	30 [5]	4	145	25 [5]
Texas, northern	4	165	11	4	160	11
Texas, southern	3	126	9	3	134	9
Arizona and New Mexico	3	109	8	3	W	W
Colorado and Wyoming	2	W	W	2	W	W
Idaho, Montana, Nevada, Utah	1	W	W	1	W	W
Alaska and Hawaii	1	3	--	1	W	W
California, northern, Oregon, Washington	3	85	10	3	79	10
California, southern	4	479	13	4	488 [5]	12 [5]
Independent importers, n.e.c.	--	--	4	--	--	2 [5]
Total[6]	79	4,450 [5, 7]	490 [5]	77	4,449 [5, 7]	504 [5]

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Includes masonry, portland-lime, and plastic cements. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]District assignation is the location of the reporting facilities. Includes independent importers for which regional assignations were possible.

[3]Includes cement produced from imported clinker.

[4]Includes imported cement.

[5]Data, even when they appear to be unrounded, contain estimates for nonrespondent or incompletely reporting facilities.

[6]Data may not add to totals shown because of independent rounding.

[7]Production directly from clinker accounted for 95% of the total in 2001 and 2002. Production from portland cement accounted for the remainder.

TABLE 5

CLINKER CAPACITY AND PRODUCTION IN THE UNITED STATES IN 2002, BY DISTRICT[1]

(Thousand metric tons unless otherwise specified)

District	Active plants[2]				Number of kilns[3]	Daily capacity[4]	Average days of routine maintenance	Apparent annual capacity[5]	Production[6]	Percentage of capacity utilized	Yearend stocks[7]
	Process used										
	Wet	Dry	Both	Total							
Maine and New York	3	1	--	4	5	10.4 [8]	22.5 [8]	3,560 [8]	3,109	87.3 [8]	259 [8]
Pennsylvania, eastern	2	5	--	7	14	15.6	24.5	5,250 [8]	4,656	88.7 [8]	317
Pennsylvania, western	2	1	--	3	7	5.0 [8]	28.3 [8]	1,700 [8]	1,472	86.6 [8]	78 [8]
Illinois	--	4	--	4	8	8.6	15.6	2,964	2,550	86.0	222
Indiana	1	3 [9]	--	4	8	10.3	27.2	3,476	3,070	88.3	138
Michigan	1	2	--	3	8	13.8	27.9 [8]	4,620 [8]	4,082	88.3 [8]	395 [8]
Ohio	1	1	--	2	3	3.4	14.3	1,200	976	81.3	38
Iowa, Nebraska, South Dakota	--	4	1	5	9	13.6	23.2 [8]	4,620 [8]	4,127	89.3 [8]	238
Kansas	1	3	--	4	10	9.2	19.2	3,143	2,373	75.5	148
Missouri	2	3	--	5	6	15.4	25.8	5,197	4,512	86.8 [8]	347
Florida[10]	1	4	--	5	7	12.7	19.8 [8]	4,400 [8]	3,677	83.6 [8]	160
Georgia, Virginia, West Virginia	1	3	--	4	7	10.7	29.2 [8]	3,590 [8]	2,647	73.6	216
Maryland	1	2	--	3	4	8.1	19.8	2,742	1,975	72.0	143
South Carolina	2	1	--	3	7	8.8	25.1 [8]	2,980 [8]	2,445	82.1 [8]	206
Alabama	--	5	--	5	7	18.4	22.9	6,108	4,397	72.0	159
Kentucky, Mississippi, Tennessee	1	3	--	4	4	10.7	25.0	3,604	2,968	82.3	251
Arkansas and Oklahoma	2	2	--	4	10	8.0	20.0	2,770	2,531	91.4	209
Texas, northern	2	3	1	6	16	21.5	17.9 [8]	7,470 [8]	6,099	81.7 [8]	502
Texas, southern	--	4	1	5	6	13.4	17.1 [8]	4,690 [8]	4,274	91.2 [8]	276
Arizona and New Mexico	--	3	--	3	10	10.6	15.2	3,708	2,147	57.9	152
Colorado and Wyoming[11]	--	4	--	4	5	10.3	16.2	3,627	1,916	52.8	114
Idaho, Montana, Nevada, Utah	3	4	--	7	9	8.6	21.1 [8]	2,970 [8]	2,670	90.0 [8]	138 [8]
California, northern	--	3	--	3	3	8.7	17.7 [8]	3,050 [8]	2,562	83.9 [8]	158
California, southern	--	8	--	8	17	28.7	31.6 [8]	9,580 [8]	8,625	90.0 [8]	639
Oregon and Washington	1	2	--	3	3	6.4	47.7	2,035	1,660	81.6	52
Total or average[12]	27	78	3	108	193	291.0	22.5 [8]	99,000 [8]	81,517	82.3 [8]	5,550 [8]
Puerto Rico	--	2	--	2	2	5.9	26.0	2,005	1,443	72.0	209
Grand total or average[12]	27	80	3	110	195	297.0	22.5 [8]	101,000 [8]	82,959	82.1 [8]	5,760 [8]

-- Zero.

[1]Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Includes white cement plants. Includes plants active for at least one day during the year.

[3]Kilns active at least one day during year. Excludes idle kilns (full year) that cannot be restarted (fully permitted) in less than 6 months.

[4]Sum of reported daily kiln capacities for each plant in district.

[5]Sum of apparent individual kiln capacities; for each kiln calculated as 365 days minus reported days shut down for routine maintenance and thus multiplied by the unrounded, reported, daily capacity.

[6]Several districts have one or more annual survey nonrespondent facilities for which estimates were made for most data categories. However, for all nonrespondent clinker producers, reported 12-month production data were available from monthly surveys and were incorporated.

[7]Includes imported clinker and clinker stockpiles at grinding plants.

[8]Data, even when they appear to be unrounded, contain estimates for nonrespondent or incompletely reporting facilities.

[9]Includes one semidry kiln.

[10]Excludes one plant (single day kiln) that started operations in December.

[11]Includes one plant in Colorado that closed during the year.

[12]Data may not add to totals shown because of independent rounding.

TABLE 6

RAW MATERIALS USED IN PRODUCING CLINKER AND CEMENT IN THE UNITED STATES[1, 2]

(Thousand metric tons)

Raw materials	2001		2002	
	Clinker	Cement[3]	Clinker	Cement[3]
Calcareous:				
Limestone (includes aragonite, marble, chalk, coral)	95,600	1,600	107,000	1,330
Cement rock (includes marl)	21,900	100	16,200	39
Cement kiln dust[4]	600	100	688	164
Lime[5]	300	40	196	34
Other	20	20	5	18
Aluminous:				
Clay	4,500	10	4,770	--
Shale	3,200	10	3,230	9
Other (includes staurolite, bauxite, aluminum dross, alumina, other)	500	--	540	--
Ferrous: iron ore, pyrites, millscale, other	1,500	--	1,260	--
Siliceous:				
Sand and calcium silicate	3,500	--	2,960	2
Sandstone, quartzite soils, other	500	--	692	--
Fly ash	1,600	70	1,960	64
Other ash, including bottom ash	800	--	990	--
Granulated blast furnace slag[6]	--	300	60	369
Other blast furnace slag	200	--	162	--
Steel slag	500	--	481	--
Other slags	50	5	67	4
Natural rock pozzolans[7]	--	50	--	28
Other pozzolans[8]	100	9	165	7
Other:				
Gypsum and anhydrite	--	4,800	--	4,740
Other, n.e.c.	40	50	21	52
Total[9]	135,000 r	7,250 r	141,000	6,860
Clinker, imported, x 1.7[10]	--	5,030	--	5,230
Grand total[9]	135,000	12,300 r	141,000	12,100

rRevised. -- Zero.

[1]Includes Puerto Rico nonfuel materials only.

[2]Data are rounded because they include estimates for a number of nonrespondent or incompletely reporting plants.

[3]Includes portland, blended, and masonry cements.

[4]Data are probably underreported.

[5]Data are probably underreported on the basis of reported volumes of masonry cements.

[6]Includes both ground and unground material.

[7]Includes pozzolana and burned clays and shales (where not reported directly as clay or shale).

[8]Includes diatomite, other microcrystalline silica, silica fume, and other pozzolans, whether or not used as such.

[9]Data may not add to totals shown because of independent rounding.

[10]Outside purchases of foreign clinker times 1.7; conversion factor is based on past raw materials ratios for U.S. clinker production.

TABLE 7

CLINKER PRODUCED AND FUEL CONSUMED BY THE CEMENT INDUSTRY IN THE UNITED STATES, BY PROCESS[1, 2]

	Clinker produced			Fuel consumed					Waste fuel		
Kiln process	Active plants	Quantity (thousand metric tons)	Percent-age of total	Coal[3] (thousand metric tons)	Coke[4] (thousand metric tons)	Petroleum coke (thousand metric tons)	Oil[5] (thousand liters)	Natural gas (thousand cubic meters)	Tires (thousand metric tons)	Solid (thousand metric tons)	Liquid (thousand liters)
2001:[6]											
Wet	28	14,782	18.5	2,050	40	400	33,110	33,000	130	220	653,000
Dry	77	60,169	75.2	7,520	320	930	59,760	251,000	150	40	117,000
Both	6	5,029	6.3	670	60	40	450	113,000	20	60	59,000
Total[7]	111	79,979	100.0	10,240	420	1,370	93,320	397,000	300	320	829,000
2002:[6]											
Wet	27	14,599	17.6	1,990	15	500	22,870	45,000	87	73	725,400
Dry	80	64,633	77.9	7,170	3	1,380	69,720	367,000	210	39	188,400
Both	3	3,727	4.5	540	--	30	--	67,000	6	--	47,800
Total[7]	110	82,959	100.0	9,690	17	1,910	92,590	479,000	304	112	961,600

-- Zero.

[1]Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Includes Puerto Rico.

[3]All reported to be bituminous.

[4]Data are likely all or mostly misreported petroleum coke.

[5]Distillate and residual fuel oil; excludes used oils included under liquid wastes.

[6]Fuel consumption data are rounded as they contain estimated data for nonrespondent or incompletely reporting plants. For nonrespondent plants, however, clinker production data were available from monthly surveys and were incorporated without rounding.

[7]Data may not add to totals shown because of independent rounding.

TABLE 8

ELECTRIC ENERGY USED AT CEMENT PLANTS IN THE UNITED STATES, BY PROCESS[1]

Plant process	Electric energy used[2]						Finished cement produced[3] (thousand metric tons)	Average consumption (kilowatt-hours per ton of cement produced)
	Generated at plant		Purchased		Total			
	Number of plants	Quantity (million kilowatt-hours)	Number of plants	Quantity (million kilowatt-hours)	Quantity (million kilowatt-hours)	Percentage		
2001:								
Integrated plants:								
Wet	--	--	28	2,260	2,260	17.6	16,690	136
Dry	5	560	77	9,180	9,740	75.9	65,960	148
Both	--	--	6	830	830	6.5	5,400	154
Total or average[4]	5	560	111	12,300	12,800	100.0	88,050	146
Grinding plants[5]	--	--	6	160	160	--	2,280	75
Exclusions[6]	--	--	2	--	--	--	120	--
2002:								
Integrated plants:								
Wet	--	--	27	2,190	2,190	16.8	16,044	136
Dry	5	539	80	9,700	10,200	78.6	69,150	148
Both	--	--	3	595	595	4.6	3,742	159
Total or average[4]	5	539	110	12,500	13,000	100.0	88,936	146
Grinding plants[5]	--	--	6	175	175	--	2,192	80
Exclusions[6]	--	--	2	--	--	--	136	--

-- Zero.

[1]Includes Puerto Rico.

[2]Electricity data are rounded because they include estimates for a number of nonrespondent plants or incomplete reporting by respondent facilities.

[3]Includes portland and masonry cements.

[4]Data may not add to totals shown because of independent rounding.

[5]Excludes plants that reported production only of masonry cement.

[6]Tonnage of cement produced by plants that reported production of masonry cement only.

TABLE 9

CEMENT SHIPMENTS TO FINAL CUSTOMER, BY DESTINATION AND ORIGIN[1, 2]

(Thousand metric tons)

Destination and origin	Portland cement		Masonry cement	
	2001	2002[3]	2001	2002[3]
Destination:				
Alabama	1,569	1,479	141	145
Alaska[4]	133	137	--	--
Arizona	3,265	3,293	107	107
Arkansas	976	946	56	61
California, northern	4,668	4,567	111	106
California, southern	7,924	8,066	390	411
Colorado	2,660	2,612	45	24
Connecticut[4]	812	746	15	14
Delaware[4]	162	193	11	11
District of Columbia[4]	184	186	1	1
Florida	7,527	7,828	635	681
Georgia	3,412	3,087	310	292
Hawaii	280	312	4	5
Idaho	568	567	1	1
Illinois, excluding Chicago	1,698	1,728	23	22
Chicago, metropolitan[4]	2,464	2,384	66	62
Indiana	2,252	2,081	98	92
Iowa	1,698	1,734	6	8
Kansas	1,624	1,498	14	15
Kentucky	1,353	1,228	101	96
Louisiana[4]	1,770	1,679	50	52
Maine	225	208	6	5
Maryland	1,381	1,309	94	85
Massachusetts[4]	1,644	1,395	24	21
Michigan	3,557	3,146	160	146
Minnesota[4]	1,973	1,998	29	48
Mississippi	950	910	54	56
Missouri	2,672	2,500	43	44
Montana	353	323	1	1
Nebraska	1,201	1,184	9	9
Nevada	1,943	1,843	28	20
New Hampshire[4]	260	244	7	6
New Jersey[4]	2,069	1,975	78	79
New Mexico	888	824	7	8
New York, eastern	644	698	30	28
New York, western[4]	1,044	804	34	30
New York, metropolitan[4]	1,651	1,655	65	67
North Carolina[4]	2,734	2,510	327	294
North Dakota[4]	303	311	2	3
Ohio	4,029	3,763	194	192
Oklahoma	1,543	1,363	46	48
Oregon	981	1,040	1	1
Pennsylvania, eastern	2,312	2,187	62	65
Pennsylvania, western	1,283	1,133	69	68
Rhode Island[4]	182	167	4	3
South Carolina	1,386	1,369	140	135
South Dakota	460	423	2	2
Tennessee	1,963	1,809	215	210
Texas, northern	6,810	6,270	217	195
Texas, southern	5,942	6,002	126	141
Utah	1,297	1,166	1	1
Vermont[4]	122	116	4	3
Virginia	2,326	2,119	160	157
Washington	1,961	1,899	3	2
West Virginia	461	424	27	26
Wisconsin	2,298	2,054	32	29
Wyoming	365	413	1	1
Total[5]	108,212	103,905	4,482	4,435

See footnotes at end of table.

TABLE 9--Continued
CEMENT SHIPMENTS TO FINAL CUSTOMER, BY DESTINATION AND ORIGIN[1, 2]

(Thousand metric tons)

Destination and origin	Portland cement		Masonry cement	
	2001	2002	2001	2002
Destination--Continued:				
Foreign countries[6]	442	438	--	(7)
Puerto Rico	1,865	1,882	--	--
Grand total[5]	110,520	106,225	4,482	4,436
Origin:				
United States	86,602	85,431	4,435	4,400
Puerto Rico	1,523	1,542	--	--
Foreign countries[8]	22,395	19,250	48	37
Total shipments[5]	110,520	106,225	4,482	4,436

-- Zero.

[1]Includes cement produced from imported clinker and imported cement shipped by domestic producers and importers.

[2]Data are developed from consolidated monthly surveys of shipments by companies and may differ from data in tables 1, 11-13, 15, and 16, which are from annual surveys of individual plants and importers. Although presented unrounded, data are believed to be accurate to no more than three significant figures.

[3]Data incorporates monthly revisions available through the June 2003 data cycle.

[4]Has no cement plants.

[5]Data may not add to totals shown because of independent rounding.

[6]Includes shipments to U.S. possessions and territories.

[7]Less than 1/2 unit.

[8]Imported cement distributed in the United States as reported by domestic producers and other importers. Data do not match the imports calculated from tables 19 and 22.

TABLE 10

CEMENT SHIPMENTS, BY DESTINATION (REGION AND CENSUS DISTRICT)[1, 2]

	Portland cement				Masonry cement			
	Quantity (thousand metric tons)		Percentage of U.S. total		Quantity (thousand metric tons)		Percentage of U.S. total	
Region and census district	2001	2002	2001	2002	2001	2002	2001	2002
Northeast:								
New England[3]	3,245	2,877	3	3	58	52	1	1
Middle Atlantic[4]	9,003	8,452	8	8	337	338	8	8
Total[5]	12,249	11,329	11	11	395	390	9	9
South:								
South Atlantic[6]	19,572	19,024	18	18	1,705	1,683	38	38
East South Central[7]	5,834	5,426	5	5	511	507	11	11
West South Central[8]	17,041	16,259	16	16	494	497	11	11
Total[5]	42,447	40,709	39	39	2,710	2,686	60	60
Midwest:								
East North Central[9]	16,298	15,154	15	15	573	542	13	12
West North Central[10]	9,931	9,649	9	9	105	130	2	3
Total[5]	26,230	24,803	24	24	678	672	15	15
West:								
Mountain[11]	11,339	11,041	10	11	191	163	4	4
Pacific[12]	15,948	16,021	15	15	508	525	11	11
Total[5]	27,287	27,063	25	26	699	688	16	16
Grand total[5]	108,212	103,905	100	100	4,482	4,435	100	100

[1]Excludes Puerto Rico. Includes imported cement shipped by importers and cement ground from imported clinker. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Data are based on table 9.

[3]New England includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

[4]Middle Atlantic includes New Jersey, New York, and Pennsylvania.

[5]Data may not add to totals shown because of independent rounding.

[6]South Atlantic includes Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.

[7]East South Central includes Alabama, Kentucky, Mississippi, and Tennessee.

[8]West South Central includes Arkansas, Louisiana, Oklahoma, and Texas.

[9]East North Central includes Illinois, Indiana, Michigan, Ohio, and Wisconsin.

[10]West North Central includes Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.

[11]Mountain includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

[12]Pacific includes Alaska, California, Hawaii, Oregon, and Washington.

TABLE 11
SHIPMENTS OF PORTLAND CEMENT FROM MILLS IN THE UNITED STATES, IN BULK AND IN CONTAINERS, BY TYPE OF CARRIER[1, 2]

(Thousand metric tons)

	Shipments from plant to terminal		Shipments to final domestic consumer				
			From plant to consumer		From terminal to consumer		Total shipments to consumer
	In bulk	In containers[3]	In bulk	In containers[3]	In bulk	In containers[3]	
2001:							
Railroad	11,610	140	1,840 r	--	420	(4)	2,260
Truck	2,600	280	57,950	2,480	46,360	690	107,480
Barge and boat	9,880	--	130	--	50	--	180
Other	--	--	--	--	--	--	--
Total[5]	24,100	420	59,900	2,480	46,800	690	109,920 [6]
2002:							
Railroad	11,600	29	1,620	--	368	1	1,990
Truck	2,590	220	55,700	2,350	45,100	586	104,000
Barge and boat	9,320	--	127	1	108	--	236
Other	--	--	--	--	--	--	--
Total[5]	23,500	248	57,400	2,350	45,600	587	106,000 [6]

[r]Revised. -- Zero.

[1]Includes Puerto Rico. Includes imported cement and cement made from imported clinker. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Data are rounded because they include estimates from a number of nonrespondent or incompletely reporting plants.

[3]Includes bags and jumbo bags.

[4]Less than 1/2 unit.

[5]Data may not add to totals shown because of independent rounding.

[6]Shipments calculated on the basis of an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.

TABLE 12

PORTLAND CEMENT SHIPPED BY PRODUCERS AND IMPORTERS IN THE UNITED STATES, BY DISTRICT[1]

District[3, 4]	2001			2002		
		Value[2]			Value[2]	
	Quantity (thousand metric tons)	Total (thousands)	Average (dollars per metric ton)	Quantity (thousand metric tons)	Total (thousands)	Average (dollars per metric ton)
Maine and New York	3,690 [5]	$275,000 [5]	$74.50 [5]	3,440 [5]	$264,000 [5]	$76.50 [5]
Pennsylvania, eastern	5,602	387,855	69.24	4,608	336,981	73.13
Pennsylvania, western	1,630 [5]	126,000 [5]	77.50 [5]	1,407	110,000 [5]	78.50 [5]
Illinois	3,095	230,612	74.50	2,844	209,835	73.77
Indiana	3,108	209,113	67.29	2,900	194,945	67.23
Michigan and Wisconsin	7,270 [5]	561,000 [5]	77.00 [5]	6,540 [5]	490,000 [5]	75.00 [5]
Ohio	1,116	86,508	77.49	1,051	80,446	76.52
Iowa, Nebraska, South Dakota	5,100	391,907	76.84	4,892	379,492	77.57
Kansas	1,850 [5]	142,000 [5]	76.50 [5]	2,048	157,373	76.85
Missouri	5,918	433,764	73.30	5,886	407,544	69.24
Florida	7,120 [5]	516,000 [5]	72.50 [5]	7,413	558,389	75.32
Georgia, Virginia, West Virginia	3,021	232,372	76.92	2,747	209,000 [5]	76.00 [5]
Maryland	1,986	143,220	72.12	2,094	155,565	74.30
South Carolina	3,113	200,476	64.40	2,857	200,330	70.13
Alabama	4,280 [5]	336,000 [5]	78.50 [5]	4,290 [5]	282,000 [5]	65.50 [5]
Kentucky, Mississippi, Tennessee	2,720 [5]	205,000 [5]	75.50 [5]	2,990	208,000 [5]	69.50 [5]
Arkansas and Oklahoma	2,700 [5]	204,000 [5]	75.50 [5]	2,520 [5]	181,000 [5]	72.00 [5]
Texas, northern	6,735	510,215	75.75	6,004	434,000 [5]	72.00 [5]
Texas, southern	6,040 [5]	407,000 [5]	67.00 [5]	5,967	404,128	67.72
Arizona and New Mexico	3,740 [5]	346,000 [5]	92.50 [5]	3,509	318,164	90.66
Colorado and Wyoming	2,640 [5]	207,000 [5]	78.00 [5]	2,521	191,479	75.96
Idaho, Montana, Nevada, Utah	2,984	237,462	79.57	2,860	232,000 [5]	81.00 [5]
Alaska and Hawaii	379	50,984	134.61	410	53,313	130.11
California, northern	3,546	289,400	81.62	3,441	273,661	79.53
California, southern	8,815	665,368	75.48	9,546	720,350	75.46
Oregon and Washington	2,010 [5]	157,000 [5]	78.00 [5]	2,099	165,000 [5]	78.50 [5]
Independent importers, n.e.c.[6]	7,850 [5]	568,000 [5]	72.00 [5]	7,213	558,000 [5]	77.50 [5]
Total or average[7, 8]	108,050 [5]	8,121,000 [5]	75.00 [5]	104,000 [5]	7,770,000 [5]	74.50 [5]
Puerto Rico	1,873	W	W	1,885	W	W
Grand total[7, 8]	109,920 [5]	W	W	106,000 [5]	W	W

W Withheld to avoid disclosing company proprietary data.

[1]Includes imported portland cement (gray and white) and cement produced from imported clinker. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Values represent mill net or ex-plant (free on board plant) valuations of total sales to final customers, including sales from plant distribution terminals. The data are ex-terminal for independent terminals. All varieties of portland cement, and both bag and bulk shipments, are included. Unless otherwise specified, data are presented unrounded, but may include cases where value data (only) were missing from survey forms and so were estimated. Accordingly, unrounded data should be viewed as cement value indicators, good to no better than the nearest $0.50 or even $1.00 per ton.

[3]The district location is that of the reporting facility. Shipments may include material sold into other districts.

[4]Includes shipments by independent importers where district assignation is possible.

[5]Data are rounded because they contain estimates for nonrespondent or incompletely reporting facilities.

[6]Importers for which district assignations were not possible.

[7]Shipments calculated on the basis of an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.

[8]Data may not add to totals shown because of independent rounding.

TABLE 13

MASONRY CEMENT SHIPPED BY PRODUCERS AND IMPORTERS IN THE UNITED STATES, BY DISTRICT[1, 2]

District[4]	2001			2002		
		Value[3]			Value[3]	
	Quantity (thousand metric tons)	Total (thousands)	Average (dollars per metric ton)	Quantity (thousand metric tons)	Total (thousands)	Average (dollars per metric ton)
Maine and New York	140 [5]	$13,000 [5]	$95.00 [5]	97 [5]	$9,640 [5]	$100.00 [5]
Pennsylvania, eastern	225	26,866	119.49	230	25,400 [5]	110.00 [5]
Pennsylvania, western	100 [5]	11,000 [5]	110.00 [5]	88	9,980 [5]	114.00 [5]
Illinois, Indiana, Ohio	511	57,005	111.47	484	55,184 [5]	114.00 [5]
Michigan	290 [5]	29,000 [5]	100.00 [5]	273	28,400	104.00
Iowa, Nebraska, South Dakota	35	3,789	108.58	44 [5]	4,940 [5]	113.00 [5]
Kansas and Missouri	137	12,202	88.84	131	11,746	89.90
Florida	559	62,905	112.55	610	65,583	107.50
Georgia, Maryland, Virginia, West Virginia	385	49,197	127.78	388	54,800 [5]	141.00 [5]
South Carolina	442	47,753	108.01	389	37,616	96.59
Alabama	430 [5]	44,000 [5]	102.00 [5]	428 [5]	47,300 [5]	111.00 [5]
Kentucky, Mississippi, Tennessee	80 [5]	9,000 [5]	110.00 [5]	93	10,900 [5]	117.00 [5]
Arkansas and Oklahoma	130 [5]	13,000 [5]	103.00 [5]	135 [5]	13,800 [5]	102.00 [5]
Texas, northern	137	16,359	119.06	133	16,100 [5]	121.00 [5]
Texas, southern	140 [5]	14,000 [5]	106.00 [5]	139	13,454	96.49
Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming	143	14,311	100.06	143	14,500 [5]	102.00 [5]
Alaska and Hawaii	4	841	223.76	4	887	223.77
California, Oregon, Washington[6]	560	51,110	91.31	79	7,933	100.00
California, southern	W	W	W	487	44,237	90.75
Independent importers, n.e.c.[7]	30 [5]	4,000 [5]	145.00 [5]	27	3,370	124.00
Total or average[8, 9]	4,460 [5]	479,000 [5]	107.00 [5]	4,400 [5]	476,000 [5]	108.00 [5]

W Data combined into other States (California, Oregon and Washington) to avoid disclosing company proprietary data.

[1]Shipments are to final domestic customers and include shipments of imported cement and cement made from imported clinker. Excludes Puerto Rico, which did not record any masonry cement sales. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Includes gray, white, and colored varieties of masonry, portland-lime, and plastic cements.

[3]Values represent ex-plant (free on board plant) valuations of total sales to final customers, including sales from plant distribution terminals. The data are ex-terminal for independent terminals. All varieties of portland cement, and both bag and bulk shipments, are included. Unless otherwise specified, data are presented unrounded, but may include cases where value data (only) were missing from survey forms and so were estimated. Accordingly, unrounded data should be viewed as cement value indicators, good to no better than the nearest $0.50 or even $1.00 per metric ton.

[4]District location is that of the reporting facilities. Shipments may include material sold into other districts.

[5]Data are rounded because they contain estimates for nonrespondent or incompletely reporting facilities.

[6]Data for 2001 include northern and southern California. Data for 2002 exclude southern California.

[7]Importers for which district assignations were not possible.

[8]Tonnages based on annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.

[9]Data may not add to totals shown because of independent rounding.

TABLE 14
AVERAGE MILL NET VALUE OF CEMENT IN THE UNITED STATES[1, 2]

(Dollars per metric ton)

Year	Gray portland cement	White portland cement	All portland cement	Prepared masonry cement	All classes of cement
2001	74.50	155.00	75.00	107.00	76.50
2002	74.00	157.00	74.50	108.00	76.00

[1]Excludes Puerto Rico. Mill net value is the actual value of sales to customers, free on board plant or import terminal, less all discounts and allowances, less any freight charges from U.S. producing plant to distribution terminal and to final customers.

[2]Data are rounded because of an unusually large number of nonrespondents for which estimates for both sales tonnages and values were made.

TABLE 15

PORTLAND CEMENT SHIPMENTS IN 2002, BY DISTRICT AND TYPE OF CUSTOMER[1]

(Thousand metric tons)

District[2, 3]	Ready-mixed concrete	Concrete product manufacturers[4]	Contractors[5]	Building material dealers	Oil well, mining, waste[6]	Government and miscellaneous[7]	Total[8, 9]
Maine and New York	2,670	539	16	168	2	44	3,440
Pennsylvania, eastern	2,970	1,080	254	298	--	12	4,608
Pennsylvania, western	1,030	163	162	--	6	42	1,407
Illinois	2,180	360	133	18	156	--	2,844
Indiana	2,240	392	169	88	12	4	2,900
Michigan and Wisconsin	5,130	571	623	113	18	83	6,540
Ohio	857	123	41	26	--	4	1,051
Iowa, Nebraska, South Dakota	3,810	580	355	51	61	31	4,892
Kansas	1,550	168	248	50	26	4	2,048
Missouri	4,680	458	373	69	--	308	5,886
Florida	5,530	1,430	95	349	--	7	7,413
Georgia, Virginia, West Virginia	2,110	332	164	124	11	6	2,747
Maryland	1,600	382	57	30	--	26	2,094
South Carolina	2,060	530	197	47	--	19	2,857
Alabama	3,190	658	85	208	27	126	4,290
Kentucky, Mississippi, Tennessee	2,420	235	163	37	2	131	2,990
Arkansas and Oklahoma	1,730	302	338	48	57	46	2,520
Texas, northern	4,060	492	1,050	112	210	77	6,004
Texas, southern	4,030	690	796	136	298	20	5,967
Arizona and New Mexico	2,700	361	183	111	35	125	3,509
Colorado and Wyoming	1,900	240	50	1	39	291	2,521
Idaho, Montana, Nevada, Utah	2,340	192	71	43	158	58	2,860
Alaska and Hawaii	332	53	4	20	--	1	410
California, northern	2,830	264	186	153	--	11	3,441
California, southern	6,580	2,070	423	399	59	11	9,546
Oregon and Washington	1,680	133	78	156	--	55	2,099
Independent importers, n.e.c.[10]	5,710	928	256	234	3	78	7,213
Total[8]	77,900	13,700	6,570	3,090	1,180	1,620	104,000
Puerto Rico	817	237	70	493	--	269	1,885
Grand total[8]	78,700	14,000	6,640	3,580	1,180	1,890	106,000

-- Zero.

[1]Includes shipments of imported cement and cement ground from imported clinker. Data other than district totals are presented rounded to three significant digits but are likely accurate to only two significant digits. District totals are accurate to no more than three significant digits.

[2]District location is that of the reporting facility. Shipments may include material sold into other districts.

[3]Includes shipments by independent importers, where district assignations were possible.

[4]Grand total shipments to concrete product manufacturers include brick-block--6,170; precast-prestressed--3,160; pipe--1,840; and other or unspecified--2,800.

[5]Grand total shipments to contractors include airport--471; road paving--4,060; soil cement--865; and other or unspecified--1240.

[6]Grand total shipments to oil well, mining, and waste include oil well drilling--919; mining--141; and waste stabilization--121.

[7]Includes shipments for which customer types were not specified.

[8]Data may not add to totals shown because of independent rounding.

[9]District totals are rounded as they include estimates for nonrespondent facilities.

[10]Shipments by independent importers for which district assignations were not possible.

TABLE 16
PORTLAND CEMENT SHIPPED FROM PLANTS IN THE UNITED STATES TO DOMESTIC CUSTOMERS, BY TYPE[1, 2]

(Thousand metric tons)

Type	2001	2002
General use and moderate heat (Types I and II) (gray)	96,970	90,800
High early strength (Type III)	3,830	3,820
Sulfate resisting (Type V)	4,870	7,300
Block	550	607
Oil well	1,150	889
White[3]	870	952
Blended:		
Portland, natural pozzolans	192	187
Portland, granulated blast furnace slag	560	753
Portland, fly ash	391	218
Other blended cement[4]	362	365
Total[5]	1,510	1,520
Expansive and regulated fast setting	64	66
Miscellaneous[6]	110	55
Grand total[5, 7]	109,920	106,000

[1]Includes imported cement. Includes Puerto Rico. Even where presented unrounded, data are believed to be accurate to no more than three significant digits.

[2]Data are rounded as they contain estimates for nonrespondent facilities.

[3]Mostly Type I, II, but may include Types III-V and block varieties.

[4]Includes blends with other pozzolans, such as cement kiln dust and silica fume.

[5]Data may not add to totals shown because of independent rounding.

[6]Includes low heat (Type IV), waterproof, and other portland cements.

[7]Shipments are derived from an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.

TABLE 17
U.S. EXPORTS OF HYDRAULIC CEMENT AND CLINKER, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

Country of destination	2001		2002	
	Quantity	Value[2]	Quantity	Value[2]
Bahamas, The	14	1,789	17	1,822
Belize	4	175	(3)	167
Brazil	2	237	1	90
Canada	614	41,553	704	45,809
Chile	1	80	1	39
China	8	367	1	149
Costa Rica	2	272	(3)	34
Dominican Republic	2	342	2	277
Jamaica	6	296	37	1,510
Japan	2	192	2	270
Korea, Republic of	3	228	1	70
Mexico	43	6,335	46	4,860
Netherlands Antilles	(3)	35	2	112
Nigeria	2	87	1	53
Norway	3	158	(3)	11
Panama	1	138	1	90
Portugal	1	38	1	33
Russia	4	194	1	80
Saudi Arabia	1	60	1	35
Singapore	6	253	2	79
Spain	1	31	2	117
Taiwan	1	82	1	128
Turkey	3	126	(3)	4
Ukraine	1	56	1	30
United Arab Emirates	1	34	2	98
United Kingdom	2	131	(3)	5
Venezuela	3	651	1	83
Other	15 r	2,051 r	6	1,688
Total[4]	746	55,991	834	57,743

rRevised.
[1]Includes portland and masonry cements.
[2]Free alongside ship value. The value of exports at the U.S. seaport or border point of export is based on the transaction price, including inland freight, insurance, and other charges incurred in placing the merchandise alongside the carrier. The value excludes the cost of loading.
[3]Less than 1/2 unit.
[4]Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 18

U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Country of origin	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Australia	146	3,294	6,018	(4)	17	19
Bahamas, The	32	989	1,335	--	--	--
Brazil	--	--	--	99	4,236	4,276
Bulgaria	360	13,675	18,496	356	14,467	18,902
Canada	5,110	287,078	302,684	5,181	302,930	321,946
China	3,266	99,214	137,635	2,165	66,204	88,884
Colombia	1,704 r	64,675	85,278	1,579	57,158	75,475
Croatia	23 r	4,413	5,292	25	5,052	6,214
Cyprus	--	--	--	75	1,845	1,849
Denmark	527	21,700	32,624	333	17,013	24,903
France	71	13,041	13,635	85	15,544	16,761
Germany	(4)	240	288	42	381	810
Greece	1,552	53,647	65,622	1,785	58,637	78,030
Indonesia	318	8,878	15,058	272	5,568	9,698
Italy	135	4,974	6,739	(4)	113	122
Korea, Republic of	1,326	32,646	53,572	1,625	40,312	61,792
Lebanon	--	--	--	94	1,877	3,117
Mexico	1,645	66,873	81,844	1,228	52,366	64,620
Netherlands	2	1,106	1,254	41	3,009	3,974
Norway	412 r	17,992	18,973	508	21,558	22,418
Peru	247	7,524	10,624	372	12,433	17,303
Philippines	374	7,895	12,083	294	6,841	10,567
Spain	651 r	27,676	35,616	327	15,449	19,771
Sweden	989	31,311	40,698	1,047	33,504	42,954
Taiwan	551	16,256	25,375	115	3,628	4,643
Thailand	4,070	108,884	170,513	4,259	117,969	177,581
Turkey	766 r	27,285	36,988	684	22,412	30,388
Venezuela	1,565	61,209	82,391	1,530	52,021	72,614
Other	19 r	4,599 r	5,683 r	48	6,512	8,087
Total[5]	25,861	987,074	1,266,318	24,169	939,056	1,187,718

rRevised. -- Zero.

[1]Includes portland, masonry, and other hydraulic cements. Includes imports into Puerto Rico.

[2]Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

[3]Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

[4]Less than 1/2 unit.

[5]Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 19
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER,
BY CUSTOMS DISTRICT AND COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Customs district and country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Anchorage, AK:						
Canada	1	51	113	8	449	850
China	--	--	--	18	779	1,089
Korea, Republic of	--	--	--	66	1,900	2,810
Thailand	108	2,572	5,023	--	--	--
Total[4]	109	2,623	5,135	93	3,128	4,748
Baltimore, MD:						
Belgium	--	--	--	(5)	4	6
Greece	305	11,626	14,598	250	9,648	12,826
Netherlands	(5)	349	371	1	613	672
Total[4]	305	11,975	14,969	251	10,266	13,504
Boston, MA:						
Netherlands	(5)	181	215	(5)	133	164
Norway	23 r	1,264	1,267	--	--	--
Venezuela	249	9,472	11,968	210	7,593	10,061
Total[4]	273	10,917	13,450	210	7,725	10,225
Buffalo, NY:						
Canada	646	35,435	37,363	639	39,470	41,700
Denmark	--	--	--	(5)	5	5
France	(5)	7	7	--	--	--
Norway	(5)	8	8	--	--	--
United Kingdom	6 r	1,035	1,059	4	742	792
Total[4]	652 r	36,486	38,438	642	40,217	42,498
Charleston, SC:						
Australia	31	553	1,075	--	--	--
Colombia	368	13,298	19,363	593	20,692	29,225
Greece	471	15,391	15,394	429	13,514	17,595
Indonesia	--	--	--	158	2,550	4,950
Spain	--	--	--	44	275	660
Thailand	--	--	--	70	1,153	2,299
United Kingdom	2 r	1,012	1,183	2	815	946
Venezuela	335	11,825	17,416	--	--	--
Total[4]	1,208 r	42,079	54,431	1,296	38,999	55,674
Chicago, IL:						
Canada	18	1,021	1,095	31	1,737	1,934
Japan	(5)	64	73	(5)	69	75
Netherlands	(5)	34	39	1	391	495
United Kingdom	(5)	15	22	(5)	3	4
Total[4]	18	1,133	1,229	32	2,199	2,508
Cleveland, OH:						
Belgium	(5)	9	12	--	--	--
Canada	855	45,063	46,374	744	40,333	41,147
Denmark	(5)	22	29	--	--	--
Netherlands	(5)	46	56	--	--	--
Spain	(5)	3	4	--	--	--
United Kingdom	1	277	357	--	--	--
Total[4]	856 r	45,420	46,832	744	40,333	41,147
Columbia-Snake, ID-OR-WA						
Canada	80	4,032	4,280	104	5,479	5,780
China	544	17,767	24,698	412	13,379	18,081
Total[4]	625	21,799	28,978	516	18,859	23,861
Detroit, MI:						
Brazil	--	--	--	99	4,236	4,276
Canada	1,269	78,175	79,599	1,244	82,524	84,182
Denmark	--	--	--	(5)	36	41
Total[4]	1,269	78,175	79,599	1,344	86,795	88,499

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER,
BY CUSTOMS DISTRICT AND COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Customs district and country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Duluth, MN, Canada	284	16,115	18,486	221	11,966	15,251
El Paso, TX, Mexico	561 r	20,264	25,464	406	15,250	19,284
Great Falls, MT:						
Canada	6 r	385	400	9	403	531
United Kingdom	(5)	8	10	--	--	--
Total[4]	6	393	410	9	403	531
Honolulu, HI:						
China	159 r	3,475	5,325	126	3,339	4,762
Philippines	--	--	--	153	3,728	5,282
Thailand	109	2,692	3,783	39	937	1,328
Total[4]	269	6,167	9,108	318	8,005	11,373
Houston-Galveston, TX:						
Chile	--	--	--	2	483	558
Colombia	120	4,895	7,343	116	4,887	7,301
Denmark	181	5,508	7,772	5	187	340
Egypt	--	--	--	9	837	1,030
France	(5)	234	278	(5)	209	252
Germany	(5)	138	167	(5)	13	15
India	(5)	2	2	--	--	--
Japan	(5)	8	9	(5)	22	30
Korea, Republic of	1,286	31,944	52,220	1,394	34,606	52,180
Mexico	(5)	2	4	--	--	--
Netherlands	(5)	19	22	--	--	--
Peru	188	5,751	8,149	284	9,346	13,068
Philippines	374	7,895	12,083	82	1,739	2,784
Thailand	186	4,862	6,848	167	10,302	11,850
Turkey	161	5,512	7,736	14	1,207	1,625
United Kingdom	(5)	42	46	(5)	133	153
Venezuela	18	684	903	65	2,043	2,649
Total[4]	2,514 r	67,497	103,584	2,137	66,015	93,835
Laredo, TX, Mexico	163	18,376	19,358	147	16,344	17,179
Los Angeles, CA:						
Australia	(5)	9	9	(5)	17	19
China	1,870 r	57,121	77,400	1,219	35,732	47,462
Colombia	--	--	--	1	254	317
Germany	--	--	--	(5)	6	7
Netherlands	--	--	--	(5)	9	12
Taiwan	--	--	--	115	3,628	4,643
Thailand	447	12,192	18,077	607	15,586	23,032
United Kingdom	(5)	34	40	(5)	69	79
Total[4]	2,318	69,356	95,525	1,943	55,302	75,571
Miami, FL:						
Belgium	2 r	623	660	2	379	402
Colombia	22	1,056	1,349	23	1,138	1,490
Germany	(5)	21	27	(5)	11	14
Greece	162	5,940	7,694	351	11,716	14,847
Mexico	(5)	47	51	--	--	--
Netherlands	(5)	34	42	--	--	--
Spain	583	25,202	32,235	283	15,164	19,099
Sweden	810	25,259	33,462	809	25,688	32,620
Thailand	19	579	830	--	--	--
Turkey	37	1,181	1,606	217	6,088	8,041
United Kingdom	(5)	76	97	(5)	104	132
Venezuela	52	2,116	2,882	57	1,725	2,264
Total[4]	1,688 r	62,135	80,935	1,743	62,012	78,908

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER,
BY CUSTOMS DISTRICT AND COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Customs district and country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Milwaukee, WI:						
Canada	111	6,280	6,711	143	8,049	8,569
Cyprus	--	--	--	75	1,845	1,849
Total[4]	111	6,280	6,711	218	9,894	10,417
Minneapolis, MN, Germany	(5)	5	8	(5)	7	11
Mobile, AL:						
Australia	33	578	1,188	--	--	--
Korea, Republic of	40	702	1,352	--	--	--
Lebanon	--	--	--	94	1,877	3,117
Peru	33	895	1,279	--	--	--
Thailand	288	6,258	11,801	399	8,492	14,772
United Kingdom	--	--	--	1	174	199
Venezuela	--	--	--	7	221	276
Total[4]	393 r	8,432	15,620	501	10,765	18,364
New Orleans, LA:						
Bulgaria	129 r	5,013	7,123	121	4,698	6,373
China	9	968	1,148	11	1,072	1,263
Colombia	197	8,100	9,939	28	967	1,255
Croatia	22	3,991	4,871	21	4,181	5,106
Denmark	(5)	9	10	--	--	--
France	(5)	4	5	--	--	--
Germany	(5)	37	39	--	--	--
Greece	--	--	--	206	6,833	8,865
India	--	--	--	(5)	10	10
Israel	--	--	--	(5)	13	19
Italy	135 r	4,878	6,632	--	--	--
Korea, Republic of	--	--	--	165	3,805	6,802
Netherlands	(5)	17	20	(5)	44	53
Peru	--	--	--	56	2,062	2,883
Thailand	1,519 r	43,250	69,412	1,171	30,522	45,944
Turkey	152	6,401	8,038	71	2,945	3,510
Venezuela	127	6,559	7,306	--	--	--
Total[4]	2,291	79,228	114,541	1,850	57,151	82,082
New York City, NY:						
Bahamas, The	32	989	1,335	--	--	--
Croatia	1 r	421	421	1	326	363
Denmark	(5)	43	54	8	684	684
France	(5)	2	2	--	--	--
Germany	--	--	--	(5)	8	9
Greece	282 r	9,395	12,711	131	4,255	5,826
India	(5)	2	3	--	--	--
Italy	(5)	7	11	(5)	3	3
Netherlands	1	333	378	3	1,177	1,452
Norway	389	16,719	17,698	508	21,558	22,418
Peru	26	879	1,196	--	--	--
Sweden	167	5,681	6,676	238	7,815	10,334
Switzerland	--	--	--	18	557	778
Turkey	300	10,269	14,244	179	4,993	7,330
United Kingdom	1	373	482	5	1,521	1,994
Venezuela	22	821	1,184	101	4,002	5,497
Total[4]	1,220	45,935	56,396	1,192	46,898	56,685
Nogales, AZ:						
Germany	--	--	--	(5)	25	29
Mexico	911	27,198	35,806	668	19,938	27,234
Netherlands	(5)	30	39	--	--	--
Total[4]	911	27,228	35,845	668	19,963	27,263

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER,
BY CUSTOMS DISTRICT AND COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Customs district and country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Norfolk, VA:						
Bulgaria	231 r	8,661	11,373	235	9,770	12,529
Canada	--	--	--	48	1,546	1,793
Denmark	(5)	14	20	--	--	--
France	70 r	12,781	13,327	85	15,335	16,509
Germany	(5)	25	32	(5)	7	10
Greece	260	8,951	11,925	211	6,999	9,911
Indonesia	197	5,427	8,545	114	3,018	4,748
Netherlands	(5)	39	45	1	291	359
United Kingdom	1 r	176	238	1	181	256
Total[4]	761 r	36,075	45,505	694	37,147	46,114
Ogdensburg, NY:						
Canada	210	10,851	11,162	306	16,424	16,881
France	(5)	11	12	--	--	--
Germany	--	--	--	(5)	2	2
Ireland	(5)	2	2	--	--	--
United Kingdom	(5)	9	9	(5)	15	15
Total[4]	211 r	10,872	11,184	306	16,440	16,898
Pembina, ND, Canada	286 r	12,713	12,998	217	9,287	9,694
Philadelphia, PA:						
Belgium	(5)	11	11	(5)	12	12
Colombia	--	--	--	22	750	814
Germany	--	--	--	42	300	714
Netherlands	(5)	25	27	36	272	645
Thailand	358	8,146	8,838	39	876	950
United Kingdom	(5)	72	136	--	--	--
Total[4]	359	8,254	9,013	139	2,210	3,135
Portland, ME, Canada	90	8,187	8,970	83	7,814	8,157
Providence, RI:						
Philippines	--	--	--	59	1,374	2,501
Spain	30	1,051	1,597	--	--	--
Turkey	--	--	--	118	3,616	5,402
Venezuela	489	18,461	25,371	536	18,944	27,372
Total[4]	519	19,512	26,968	713	23,934	35,275
San Diego, CA:						
China	144	4,532	6,054	4	430	433
Mexico	3	118	164	--	--	--
Thailand	401	12,698	18,014	500	16,728	22,480
Total[4]	548	17,348	24,232	503	17,158	22,913
San Francisco, CA:						
China	391	11,772	16,124	260	7,797	10,082
Taiwan	551	16,256	25,375	--	--	--
Thailand	78	3,050	4,172	505	15,062	23,109
United Kingdom	(5)	4	25	--	--	--
Total[4]	1,020	31,082	45,696	765	22,859	33,191
San Juan, PR:						
Belgium	5	327	602	3	211	392
China	113 r	2,445	5,029	114	3,649	5,678
Colombia	28	1,344	1,669	29	1,029	1,268
Denmark	235	7,313	12,538	215	7,858	12,623
Italy	(5)	28	31	--	--	--
Mexico	7 r	869	997	7	834	923
Panama	--	--	--	(5)	5	6
Spain	(5)	11	12	(5)	10	12
Total[4]	387 r	12,337	20,879	369	13,596	20,902

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER,
BY CUSTOMS DISTRICT AND COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Customs district and country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Savannah, GA:						
Egypt	--	--	--	(5)	76	85
Germany	(5)	13	16	--	--	--
Indonesia	76	1,448	3,373	--	--	--
Italy	(5)	61	66	(5)	110	119
Netherlands	--	--	--	(5)	80	122
Thailand	51	1,169	2,382	144	3,445	6,902
Turkey	3 r	281	281	3	213	213
United Kingdom	(5)	8	11	(5)	16	21
Total[4]	130	2,979	6,129	147	3,939	7,463
Seattle, WA:						
Australia	82 r	2,154	3,746	--	--	--
Canada	1,053 r	52,389	57,558	1,187	60,879	67,795
China	35 r	1,135	1,858	--	--	--
Japan	1	344	500	(5)	50	83
Thailand	24	574	978	173	4,153	6,682
United Kingdom	(5)	3	4	--	--	--
Total[4]	1,195	56,599	64,643	1,360	65,082	74,560
St. Albans, VT:						
Canada	202 r	16,383	17,577	199	16,571	17,681
France	--	--	--	(5)	12	13
Total[4]	202 r	16,383	17,577	199	16,583	17,695
Tampa, FL:						
Colombia	968	35,915	45,529	766	27,441	33,806
Denmark	111 r	8,790	12,201	105	8,242	11,209
France	(5)	2	3	--	--	--
Greece	73	2,343	3,299	207	5,671	8,160
India	(5)	7	9	--	--	--
Peru	--	--	--	33	1,025	1,352
Spain	38	1,409	1,767	--	--	--
Sweden	12	371	559	--	--	--
Thailand	483	10,842	20,356	424	10,191	17,081
Turkey	112	3,640	5,083	82	3,350	4,269
Venezuela	213	8,165	11,240	494	15,186	21,186
Total[4]	2,009	71,484	100,047	2,111	71,108	97,063
U.S. Virgin Islands:						
Barbados	1	56	77	--	--	--
Colombia	2	67	87	--	--	--
Venezuela	60 r	3,106	4,122	53	2,071	2,965
Total[4]	64	3,229	4,285	53	2,071	2,965
Washington, DC, Venezuela	(5)	--	--	2	64	95
Wilmington, NC:						
Indonesia	45	2,003	3,140	--	--	--
Thailand	--	--	--	24	523	1,152
Venezuela	--	--	--	5	173	249
Total[4]	45	2,003	3,140	29	696	1,401
Grand total[4]	25,861	987,074	1,266,318	24,169	939,056	1,187,718

[r]Revised. -- Zero.

[1]Includes all varieties of hydraulic cement and clicker.

[2]Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

[3]Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

[4]Data may not add to totals shown because of independent rounding.

[5]Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 20

U.S. IMPORTS FOR CONSUMPTION OF GRAY PORTLAND CEMENT, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Australia	113	2,707	4,821	(4)	10	11
Bahamas, The	32	989	1,335	--	--	--
Bulgaria	360	13,675	18,496	356	14,467	18,902
Canada	4,148	220,077	234,274	4,108	223,559	240,196
China	3,223 r	97,600 r	135,478 r	2,150	64,614	87,072
Colombia	1,477	55,699	74,214	1,456	52,284	69,271
Denmark	407	11,705	18,889	216	7,416	12,347
Germany	(4)	78	92	42	340	764
Greece	1,414	48,354	58,529	1,523	51,016	67,171
Indonesia	273	6,875	11,918	272	5,568	9,698
Italy	135	4,885	6,643	(4)	3	3
Korea, Republic of	1,286	31,944	52,220	1,625	40,312	61,792
Mexico	1,404	39,864	53,052	1,017	29,426	39,980
Netherlands	(4)	30	39	36	263	637
Norway	367	14,906	15,801	488	19,957	20,698
Peru	214	6,630	9,346	340	11,408	15,951
Philippines	374	7,895	12,083	294	6,841	10,567
Spain	532	17,867	23,166	210	5,493	7,256
Sweden	989	31,311	40,698	1,047	33,504	42,954
Taiwan	551	16,256	25,375	115	3,628	4,643
Thailand	3,392 r	92,637 r	143,599 r	3,919	107,949	162,793
Turkey	738	25,093	34,316	658	20,325	27,984
Venezuela	1,417	55,971	76,722	1,452	48,746	68,718
Other	1	120	154	1	525	601
Total[5]	22,847 r	803,168 r	1,051,260 r	21,325	747,654	970,009

rRevised. -- Zero.

[1]Includes imports into Puerto Rico.

[2]The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

[3]Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

[4]Less than 1/2 unit.

[5]Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 21

U.S. IMPORTS FOR CONSUMPTION OF WHITE CEMENT, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Belgium	7	950	1,263	5	595	799
Canada	213	25,674	26,323	219	27,314	28,542
China	--	--	--	4	433	438
Colombia	11	981	1,250	13	1,518	1,934
Denmark	120	9,995	13,736	117	9,596	12,556
Egypt	--	--	--	9	837	1,030
Greece	14	1,173	1,497	6	497	641
Indonesia	45	2,003	3,140 [4]	--	--	--
Mexico	197	23,146	24,478	175	20,139	21,466
Norway	45	3,077	3,164 [4]	21	1,601	1,719 [4]
Spain	119	9,805	12,445	118	9,956	12,515
Thailand	37	3,291	3,403	120	6,394	7,364 [4]
Turkey	28	2,192	2,671	26	2,087	2,404
Venezuela	100	3,807	3,849 [4]	35	1,299	1,398 [4]
Other	(5)	391	421	1	518	555
Total[6]	936	86,486	97,641	867	82,784	93,361

-- Zero.

[1]Includes imports into Puerto Rico.

[2]Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

[3]Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

[4]Values of less than $90.00 (c.i.f.) per metric ton likely indicate the mistaken total or partial inclusion of gray portland or similar cement or clinker. This error happens when the importer records the wrong tariff number with the U.S. Customs Service. Values that exceed $200 per ton likely indicate misidentified specialty cement, not white cement.

[5]Less than 1/2 unit.

[6]Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 22

U.S. IMPORTS FOR CONSUMPTION OF CLINKER, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

	2001			2002		
		Value			Value	
Country	Quantity	Customs[2]	C.i.f.[3]	Quantity	Customs[2]	C.i.f.[3]
Australia	33	578	1,188	--	--	--
Brazil	--	--	--	99	4,236	4,276
Canada	661	35,622	36,013	704	39,530	39,953
China	42 r	1,597 r	2,136 r	11	1,099	1,297
Colombia	217	7,996	9,814	109	3,355	4,270
Cyprus	--	--	--	75	1,845	1,849
France	69	11,730	12,258	84	14,229	15,305
Germany	--	--	--	(4)	8	9
Greece	--	--	--	173	4,496	6,554
Korea, Republic of	40	702	1,352	--	--	--
Lebanon	--	--	--	94	1,877	3,117
Peru	33	895	1,279	33	1,025	1,352
Thailand	639 r	12,412 r	22,545 r	221	3,625	7,423
Venezuela	48	1,431	1,821	--	--	--
Total[5]	1,782 r	72,963 r	88,406 r	1,603	75,325	85,405

rRevised. -- Zero.

[1]For all types of hydraulic cement. Includes imports into Puerto Rico.

[2]Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

[3]Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

[4]Less than 1/2 unit.

[5]Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 23
HYDRAULIC CEMENT: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country	1998	1999	2000	2001	2002[e]
Afghanistan[e]	116	116	50	50	60
Albania[e]	84	106	110	39 [r]	50
Algeria[e]	7,500	7,500	8,300	8,300	9,000
Angola[e]	350	350	350	350	350
Argentina	7,091	7,187	6,114 [r]	5,545 [r]	3,910 [3]
Armenia	300	287	219	300	400 [3]
Australia[e]	6,850	7,450	7,500	7,500	7,550
Austria	3,850 [e]	3,817	3,776	3,863 [r]	3,800
Azerbaijan	201	177	200 [e]	500	800 [3]
Bahrain	230	156	89	89	67 [3]
Bangladesh[4]	1,240	2,085	3,580	5,005	5,000
Barbados	259	253	268	250 [r]	298 [3]
Belarus	2,035	2,100	1,847	1,803	2,200
Belgium	7,000 [e]	7,277	7,150	7,500 [e]	8,000
Benin[e]	200	200	250	250	250
Bhutan[e]	150	150	150	160	160
Bolivia	1,169	1,201	1,072	1,100 [e]	1,214 [p]
Bosnia and Herzegovina[e]	300	300	300	300	300
Brazil	39,942	40,270	39,208	38,927 [r]	39,500
Brunei	216	208	232	227 [r]	230
Bulgaria	1,742	2,060	2,209	2,200 [e]	2,200
Burkina Faso[e]	40	50	50	50	50
Burma	365	338	393	378 [r]	379 [3]
Cambodia[e]	150	--	--	50	50
Cameroon	740	850	890	930 [e]	950
Canada	12,124	12,634	12,612	12,986	13,200 [p]
Chile	3,888	3,036	3,491	3,500 [e]	3,600
China	536,000	573,000	597,000	661,040 [r]	704,720 [p]
Colombia[e]	9,190 [3]	9,200	9,750	9,800	9,800
Congo (Brazzaville)	--	--	20 [e]	-- [r]	--
Congo (Kinshasa)	134	159 [r]	161 [r]	192 [r]	190
Costa Rica[e]	1,085 [3]	1,100	1,150	1,100	1,100
Côte d'Ivoire[e]	650	650	650	650	650
Croatia	2,295	2,712	2,852	3,246 [r]	3,378 [3]
Cuba	1,713	1,785	1,633	1,324 [r]	1,300
Cyprus	1,207	1,157	1,398	1,369	1,600
Czech Republic	4,604	4,241	4,093	3,550	3,500
Denmark	2,528	1,926	2,009	2,010 [e]	2,010
Dominican Republic	1,885	2,945 [r]	3,122 [r]	2,976 [r]	3,071 [3]
Ecuador	2,600	2,300	2,800 [e]	2,850 [r]	2,860
Egypt	21,000 [e]	23,313	24,143	24,500 [e]	23,000
El Salvador	1,065	1,031 [r]	1,064 [r]	1,174 [r]	1,318 [3]
Eritrea[e]	45 [r]	45 [r]	45	45 [r]	45
Estonia	321	358	329	405	420 [3]
Ethiopia	750	638	880	950 [e]	1,000
Fiji[e]	90 [3]	95	95	95	95
Finland	1,098	1,310	1,422	1,325	1,350 [3]
France	19,500 [e]	20,219	20,137	19,839	20,000
French Guiana	88 [r]	88 [r, e]	88 [r, e]	58 [r]	62
Gabon	196	180 [r]	210	210 [e]	200
Georgia	200	342	348	300	300
Germany	36,610	35,912	34,727	30,989 [r]	30,000
Ghana	1,630	1,870	1,950	1,900 [e]	1,900
Greece	15,000 [e]	13,908	14,530	15,000 [r]	15,500 [3]
Guadeloupe[e]	230	230	230	230	230
Guatemala	1,500	1,600	1,600	1,600 [e]	1,600
Guinea	277	297	300	300 [e]	300
Haiti	--	--	--	204	290 [3]
Honduras	896	980	1,100	1,100 [e]	1,100
Hong Kong	1,539	1,387	1,284	1,300 [e]	1,300

See footnotes at end of table.

TABLE 23--Continued
HYDRAULIC CEMENT: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country	1998	1999	2000	2001	2002[e]
Hungary	2,999	2,979	3,326 [r]	3,452 [r]	3,500
Iceland	118	131	144	125 [r]	130
India[e]	85,000	90,000	95,000	100,000	100,000
Indonesia	22,341	23,925	27,789	31,300	33,000
Iran	21,300 [e]	22,080	23,880	26,650	30,000
Iraq[e]	2,000	2,000	2,000	2,000	2,000
Ireland[e]	2,000	2,466 [3]	2,620 [3]	2,600	2,500
Israel	6,476	6,354	6,600 [e]	6,900 [e]	7,000
Italy	35,512	37,299	38,925	39,804	40,000
Jamaica	558	504	521	596 [r]	614 [3]
Japan	81,328	80,120	81,097 [r]	76,550	71,800 [3]
Jordan	2,650	2,687	2,640	3,173 [r]	3,455 [3]
Kazakhstan	600 [e]	838	1,175	2,029 [r]	2,129 [3]
Kenya	1,426	1,204	1,146	1,085	1,229 [3]
Korea, North[e]	3,200 [r]	4,000 [r]	4,000 [r]	5,160	5,320
Korea, Republic of	46,091	48,157	51,255	52,046 [r]	55,514 [3]
Kuwait	1,345 [r]	1,435 [r]	1,540 [r]	1,600 [r, e]	1,600
Kyrgyzstan	709	386	500	469 [r]	533 [3]
Laos[e]	80	80	92	92	240
Latvia	366	W	W	W	W
Lebanon	3,316	2,714	2,808	2,890 [r]	2,852 [3]
Liberia[e]	10	15	15	15	15
Libya[e]	3,000	3,000	3,000	3,000	3,000
Lithuania	788	666	570	529 [r]	605 [3]
Luxembourg	699	742	749	750 [e]	750
Macedonia	461	520	585	450 [r]	450
Madagascar	44	46	51	52 [r]	15
Malawi	134	187	156	181	174 [3]
Malaysia	10,397	10,104	11,445	13,820	14,336 [3]
Mali[e]	-- [r]	-- [r]	-- [r]	-- [r]	--
Martinique[e]	220	220	220	220	220
Mauritania[e]	100	100	110	110	110
Mexico	27,744	29,413	31,677	29,966	31,069 [3]
Moldova	74	50	222	200	300 [3]
Mongolia	109	104	92	68	148 [3]
Morocco	7,414	7,530	8,100	10,000 [r, e]	10,200
Mozambique	212 [r]	216 [r]	270 [r]	265 [r]	274 [3]
Namibia[e]	150 [r]	(5) [r]	-- [r]	-- [r]	--
Nepal[e, 4]	280	290	300	285 [e]	290
Netherlands[e]	3,200	3,480 [3]	3,450 [3]	3,450	3,400
New Caledonia[e]	--	--	100 [r]	93 [r]	100 [3]
New Zealand[e]	950	960	950	950	950
Nicaragua	377	350	360	360 [e]	360
Niger[e]	30	30	40	40	55
Nigeria[e]	2,700	2,500	2,500	3,000	3,000
Norway	1,676	1,827	1,851	1,870 [e]	1,850
Oman	1,333 [r]	1,217 [r]	1,238 [r]	1,370 [r]	1,400
Pakistan[e]	8,901 [3]	9,600	9,900	9,900	9,900
Panama	750	760	760 [e]	760 [e]	760
Paraguay	730 [r]	730 [r]	650 [r]	650 [r]	650
Peru	4,340	3,799	3,906 [r]	3,950 [r]	4,000
Philippines	12,888	12,556	11,959	8,653	9,000
Poland	14,970	15,555	15,046	11,918	12,000
Portugal[e]	9,500	10,147 [3]	10,343 [3]	10,300	10,000
Qatar	986 [r]	1,025	1,050 [e]	1,050 [e]	1,100
Réunion	380 [r]	380 [r]	400 [r, e]	400 [r, e]	400
Romania	7,300	6,252	6,058	5,668	5,680 [3]
Russia	26,000	28,400	32,400	35,300 [r]	37,700 [3]
Rwanda	59	66	71	83 [r]	83
Saudi Arabia	15,786 [r]	16,313	18,107	20,608	21,000

See footnotes at end of table.

TABLE 23--Continued
HYDRAULIC CEMENT: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country	1998	1999	2000	2001	2002[e]
Senegal[e]	1,000	1,000	1,000	1,000	1,000
Serbia and Montenegro	2,253	1,575	2,117	2,418	2,396 [3]
Sierra Leone[e]	100 [r]	100	100	100 [r]	100
Singapore	2,340 [r]	1,660 [r]	1,150 [r]	600 [r, e]	200
Slovakia	4,705	4,718	3,045	3,123	3,100
Slovenia[e]	1,149 [3]	1,224 [3]	1,300	1,300	1,250
South Africa, sales[6]	8,738 [r]	8,068 [r]	7,971 [r]	8,036 [r]	8,525 [3]
Spain, including Canary Islands	33,080 [r]	35,782	38,115	40,512	42,500
Sri Lanka	874	976	1,008	1,108 [r]	1,018 [3]
Sudan	198	231	146	190 [r]	190
Suriname[e]	60	60	60	65 [r, 3]	65
Sweden	2,252	2,298	2,651	2,600 [r]	2,700
Switzerland	3,600 [e]	3,548	3,771	3,950	4,000
Syria[e]	4,607 [3]	4,781 [3]	4,830	4,840	4,900
Taiwan	19,652	18,283	17,572	18,128	19,363 [3]
Tajikistan	18	30	50	70	100 [3]
Tanzania	778	833	833	900 [r]	950
Thailand	22,722	25,354	25,499	27,913	31,679 [3]
Togo[e]	500	600	700	800	800
Trinidad and Tobago	690	688	743	708	700
Tunisia	4,588	4,864	5,657	5,721	6,022 [3]
Turkmenistan[e]	450	450	450	450	450
Turkey	38,200	34,258	35,825	30,125 [r]	32,577 [3]
Uganda	321	347	368	420 [r, e]	420
Ukraine	5,591	5,828	5,311	5,800	7,142 [3]
United Arab Emirates[e]	7,066 [r, 3]	7,069 [r, 3]	6,100	6,100	6,500
United Kingdom	12,409	12,697	12,452	11,854	12,000
United States, including Puerto Rico[7]	85,522	87,777	89,510	90,450 [8]	91,266 [3]
Uruguay	872 [r]	789 [r]	700 [e]	1,015 [r]	1,000
Uzbekistan[e]	3,400	4,471 [3]	3,521 [3]	4,000	4,000
Venezuela[e]	8,202 [3]	8,500	8,600	8,700	7,000
Vietnam	9,738	10,489	13,298 [r]	15,374 [r]	19,481 [3]
Yemen[e]	1,201 [3]	1,454 [3]	1,400	1,400	1,400
Zambia[e]	351 [3]	300	380	350 [r]	350
Zimbabwe[e]	1,100	1,000	1,000	800 [r]	600
Total	1,540,000 [r]	1,600,000	1,650,000 [r]	1,730,000 [r]	1,800,000

[e]Estimated. [p]Preliminary. [r]Revised. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

[1]World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown. Even where presented unrounded, reported data are believed to be accurate to no more than three significant digits.

[2]Table includes data available through August 17, 2003. Data may include clinker exports for some countries.

[3]Reported figure.

[4]Data for year ending June 30 of that stated.

[5]Less than 1/2 unit.

[6]Data are revised to remove sales of cementitious materials other than finished cement. Material sales removed (mostly fly ash and ground granulated blast furnace slag) amounted to: 1998--843; 1999--940; 2000--1,020; 2001--1,129; and 2002--1,099.

[7]Portland and masonry cements only.

[8]Data are rounded to four significant digits.